

Science of Sharing

Experimonths & Exhibits

Summative Evaluation Report

October 2015



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Abstract

Funded by the National Science Foundation, the Science of Sharing project (SoS) was a collaboration between the Exploratorium, the Museum of Life and Science, Dialogue Social Enterprise and The Heroic Imagination Project. SoS included two major components for members of the public to engage with: a permanent collection of interactive, multi-user exhibits at the Exploratorium, and a series of social-media based activities called Experimonths. SoS exhibits and Experimonths were designed to allow visitors to experiment with cooperation, trust, and social dilemmas, connect those experiences to larger real-world challenges such as environmental damage and social conflict, and learn about the scientific study of human behavior. A summative evaluation of SoS exhibits and Experimonth programs was conducted by Visitor Studies Services (VSS). Results of the VSS summative evaluation confirm that SoS exhibits and programs cause program participants and visitors to metacognate extensively about their own and others' behaviors, cognitive processes, and perspectives regarding competition, collaboration, and resource sharing. Findings also confirm that SoS program and exhibit users observe, consider, and scale up about human behavior, social interactions, and personal biases. Additionally, exhibit users reflect on personal and local behaviors regarding resource sharing and relate those to wide-scale impacts. A quasi-experimental comparison with a more typical science exhibition at the Exploratorium (Light and Sound) revealed statistically significant differences in these impacts between the two. In all, 530 exhibit visitors and Experimonth players participated in exit interviews, intercept interviews, or telephone interviews, or were captured on video for tracking and timing. All study protocols were reviewed and approved by Ethical and Independent Review Services.



Executive Summary

Goals of this Evaluation

The overarching goals of the SoS evaluation studies were to

- assess the success of the exhibit and Experimenth experiences in fostering metacognition and helping participants make conceptual connections to real-world issues of cooperation and resource sharing;
- evaluate the degree to which Experimenth engage participants in short-term (month-long) and longer-term (6 months later) behaviors regarding resource use and sharing;
- assess the success of the exhibits in fostering interest in the science associated with the exhibits;
- assess the difference in visitor impacts of SoS and a control exhibition;
- assess the difference in visitor impacts of Card Sort and Arena exhibit types within the SoS exhibition.

Three questions about exhibit use guided the tracking and timing study, and comparison studies of visitor behavior in the SoS exhibition: 1) How are visitors using the SOS exhibition? 2) What patterns of Card Sort and Arena exhibit use do visitors evidence? 3) Are those patterns of use different when children are present/absent?

Exit and intercept interviews, a tracking and timing study of exhibit users, and telephone interviews with Experimenth participants generated quantitative and qualitative data. In total, 530 people participated in interviews or were included in the observational study.

Findings – SoS Exhibition and Exhibit Use

- Based on a total average dwell time of 9.43 minutes in the SoS exhibition the average sweep rate though this 2,700 square foot exhibition is 286 square feet per minute.¹
- No differences in dwell times or patterns of exhibit use between adult-only (evening) and all-ages (daytime) audiences reached statistical significance.
- Holding times for Card Sorts and Arena style exhibits were not significantly different, although some patterns of use were. Overall, visitors were
 - more likely to observe Arena exhibits than to observe Card Sort exhibits regardless of engagement (p-value < .001);
 - more likely to observe Arenas before engaging with them, compared to Card Sort types (p-value = .007);
 - more likely to engage with Card Sort types without ever observing them compared to Arenas (p-value < .001).

Findings – SoS and Control Exhibitions Comparisons

A statistical analysis of exit interview findings revealed that SoS visitors experience the following more than Control visitors:

- exhibit-induced secondary cognitive processing (metacognition about cognitive process; code: CP2), (p=.04);
- metacognition about their own/others sharing/collaborating/competing within the games/exhibits (p<.001);
- metacognition about others' perspectives or cognitive processes regarding sharing resources (p<.001);
- metacognition about their own or others' stereotyping, prejudice, or gender bias (p<.001);
- metacognition about others' thoughts or behavior regarding cooperation/competition outside of the games/exhibits (p<.001);
- consideration of wider scale impacts based on local behaviors or issues related to resource sharing (p<.001);
- being aware of their own thinking at some time while in/using exhibits (p<.001);
- rate the exhibit more highly than Control regarding causing them to scale up to the world outside of the museum (p<.001).

¹ SoS visitors spend slightly more time in the exhibition than the 300 square feet per minute considered to be the minimal threshold for "effective" exhibits per Beverly Serrell's 51% Solution. The porous nature of the SoS exhibition space, and long dwell times at individual exhibits make SoS ill-suited to the full analysis of the 51% Solution.

Beverly Serrell, *Paying Attention: Visitors and Museums Exhibitions* (Washington DC: American Association of Museums, 1998), 72
Wendy Meluch, [The Mind Collection Summative Evaluation](#) (Visitor Studies Services, Novato, CA, prepared for Exploratorium, San Francisco, 2008), 64

SoS Exhibition and Exhibit Impacts

Interview participant responses provided evidence of these desired impacts during exhibit use (not as a result of the interview):	SoS Exit & Intercept Interviews (n=200)	
<ul style="list-style-type: none"> Metacognated about cognitive process during exhibit use (Code CP2) 	82%	It's a great way to think about your brain!
<ul style="list-style-type: none"> Metacognated about their own and/or others' thoughts and behaviors regarding collaboration, competition and/or sharing in the exhibit context 	68%	I realized that sometimes you have to take a step back and see how other people feel...
<ul style="list-style-type: none"> Watched other visitors using SoS exhibits 	42%	
<ul style="list-style-type: none"> Scaled up about competition and collaboration, self and/or others 	34%	
<ul style="list-style-type: none"> Metacognated about bias and/or stereotyping (by self and/or others) including scaling up 	22%	It makes you really aware of your biases!
<ul style="list-style-type: none"> Interacted with people outside of their social group at SoS exhibits 	21%	
<ul style="list-style-type: none"> Scaled up about other people's thoughts and/or behaviors related to resource sharing 	20%	
<ul style="list-style-type: none"> Scaled up about social interactions 	18%	SoS is all about the culture of idea sharing, like couch surfing.
<ul style="list-style-type: none"> Thought about or acknowledged wide-scale issues of resource sharing without associating them with personal or local behaviors 	16%	
<ul style="list-style-type: none"> Scaled up about one's own thoughts and/or behaviors related to resource sharing 	12%	
<ul style="list-style-type: none"> Metacognated about wide-scale impacts based on local behaviors or issues related to resource sharing 	10%	The choices that I made affected the ecosystem...
<ul style="list-style-type: none"> Associated SoS exhibits with scientific research and/or game theory 	10%	

Findings – SoS Experimentmonths

Each of the 30 interview participants who engaged in an Experimentmonth metacognated extensively about collaboration and competition, both within the games, and in relation to the wider world. They actively contemplated their own and others' natural proclivities in cooperating and competing, sometimes experimenting with other approaches in the game. Their musings included considering motivations for competitive behavior in themselves and others, both in the context of the games, and in life. Respondents thought deeply about personal bias and stereotyping including considering how and when they themselves, and others, can be influenced by them.

There is no evidence of behavior change related to resource sharing, or intentions to take into account others' perspectives regarding issues of sharing.

Study Limitations

- Assessing respondent metacognition during exhibit use or Experimentmonth participation in the context of a post-experience interview presented special challenges. Please see Appendix C for a discussion of this and other study details.
- Comparison studies which looked at evening (adult audiences) and daytime (mixed audiences) visitors used data collected on Thursday evenings during which alcohol and sometimes additional entertainment is available. Study participants self-selected to attend evening events, or daytime hours; they could not be randomly assigned to the two different conditions.
- People who are already interested in psychology, sociology and game theory, are well represented in study samples; because this is expected of a self-selected SoS audience, samples are accepted as environmentally valid.



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Thank you, everyone!
-Wendy Meluch
Visitor Studies Services



Project Overview

Science of Sharing – Brief Overview

Funded by the National Science Foundation (NSF), the Science of Sharing project (SoS), consisted of two major components for members of the public to engage with: a series of four month-long social media-based programs called Experimonths, and physical exhibits which are ongoing. The Exploratorium of San Francisco created these in collaboration with the Museum of Life and Science in Durham North Carolina (MLS), Dialogue Social Enterprise, The Heroic Imagination Project and a large international committee of experts in social psychology.

Month-long Experimonths are game-type activities which members of the public can register to participate in; all participation is on line or using apps on mobile devices. The SoS exhibition, a set of multi-user exhibits, opened in late October 2014 at the Exploratorium in San Francisco. Please see Appendices A and B for descriptions of the Experimonths and exhibits.

The Exploratorium contracted with Wendy Meluch (DBA Visitor Studies Services (VSS)) to design and conduct summative evaluation studies of two Experimonths and the physical exhibits. VSS worked closely with SoS project staff to understand project goals and create a shared coding scheme for evidence of metacognition. Staff also contributed to the summative research design which allowed VSS to build on their experience with this complex content and challenging physical environment. Please see Appendix C for detailed information about study protocols and coding. All study protocols were reviewed and approved by Ethical and Independent Review Services.

Summative Evaluation Goals

The overarching goals of the SoS evaluation studies were to

- assess the success of the exhibit and Experimonth experiences in fostering metacognition and helping participants make conceptual connections to real-world issues of cooperation and resource sharing;
- evaluate the degree to which Experimonths engage participants in short-term (month-long) and longer-term (6 months later) behaviors regarding resource use and sharing;
- assess the success of the exhibits in fostering interest in the science associated with the exhibits;
- assess the difference in visitor impacts of SoS and a control exhibit;
- assess the difference in visitor impacts of Card Sort and Arena exhibit types within the SoS exhibition.

Three questions about exhibit use guided a tracking and timing study, and comparison studies of visitor behavior in the SoS exhibition:

- 1) How are visitors using the SoS exhibition?
- 2) What patterns of Card Sort and Arena exhibit use do visitors evidence?
- 3) Are those patterns of use different when children are present/absent?

Exit and intercept interviews, a tracking and timing study of exhibit users, and telephone interviews with Experimonth participants generated quantitative and qualitative data. In total, 530 people participated in interviews or were included in the observational study.

SoS Vocabulary

Understanding SoS goals and data requires familiarity with some specialized vocabulary and a few terms invented by Experimonth users.



Metacognition – Definition & Codes

The concept of metacognition is key to SoS goals and evaluation findings. The following definitions are adapted from the SoS Verbal Metacognition Coding Scheme (v.47, 12/15/14) created by in-house SoS team members. For detailed information about metacognition and coding for it, please see the Exploratorium’s Coding Scheme document. For more detailed information about recognizing metacognition in the summative evaluation data, please see Appendix C.

- METACOGNITION (MC) is defined broadly as knowledge, awareness, or monitoring of one’s own or others’ cognitive processing. Cognition is defined as a broad (almost unspecifiably so) term, which has been traditionally used to refer to such activities as thinking, conceiving, reasoning, etc. (Dictionary of Psychology, 1995)
- Code CP1: “cognitive process aware” = simple evidence of awareness of one’s own or someone else’s primary cognitive process. Example: “I think it was the third time.”
- Code CP2: “cognitive process secondary” = a statement that meets the definition of CP1, and for which the subject of the metacognition is itself cognitive in nature. Example: “I think you would pick the bridge.”

Card Sorts & Arenas

Card Sort exhibits in SoS are game-like activities designed to generate conversations among participants. Two or three people sit at a table with embedded graphics and specially designed card sets. Sorting activities force users to consider issues around resource sharing, gender-based stereotypes, collaboration, and competition.

Arena exhibits are large-scale, competitive games designed for multiple players, and to facilitate observation by other visitors. Arena exhibits also explore issues related to collaboration, competition, and sharing.

Enemy & Friend as Verbs

Frenemy players universally use the terms “friend” and “enemy” as verbs. By selecting friend or enemy in the game, one is “friending” or “enemying.” These were considered cognitive acts for coding instances of CP1 and CP2.

SoS Exhibits – Evaluation & Findings

SoS Exhibits - Evaluation

Goals

The overarching goals of the SoS exhibit evaluation were to

- assess the success of the exhibit experiences in fostering metacognition and helping participants make conceptual connections to real-world issues of cooperation and resource sharing;
- assess the success of the exhibits in fostering interest in science and/or the social science research associated with the exhibits;
- assess the difference in visitor impacts of SoS and a control exhibition;
- assess the difference in visitor impacts of Card Sort and Arena exhibit types within the SoS exhibition.

Three questions about exhibit use guided the tracking and timing study, and the comparison studies of visitor behavior in the SoS exhibition:

- How are visitors using the SOS exhibition?
- What patterns of Card Sort and Arena exhibit use do visitors evidence? This includes dwell time comparison and sequence of use, i.e., do people observe the exhibits and do they use more than one of a single exhibit type.
- Are those patterns of use different when children are present/absent?

Impacts & Evaluation Studies Table

SoS project PI’s identified numerous, specific impacts intended for SoS exhibit users, which are listed in the following table. Those impacts are broken out by type according to NSF ISE guidelines: awareness, knowledge or understanding, engagement or interest, behavior, and skill practice. The table also indicates which impacts are targeted by each summative evaluation study.

Visitor & Participant Impacts by NSF ISE Category (provided by staff)	Exhibition Comparison Study (exit interviews)	Exhibit Comparison Study (intercept interviews)	Tracking & Timing
Awareness, knowledge or understanding:			
- knowledge of different ways of sharing (cooperation and competition)	x	x	
- awareness of collaborative problem solving	x	x	
- understanding of connections between local/individual sharing and global issues of resource allocation (scaling up)	(x)	x	
- awareness that behavioral research explores these issues	(x)	x	
- awareness that SoS exhibits are different from others	x	x	
Engagement or interest:			
- interest in the ideas above that focus on resource sharing	x	x	
- engagement with interpersonal interactions involving sharing and problem solving	x	x	
- interest in factors affecting social interactions	x	x	
- visitors observe and discuss human behavior	x	x	
- impact of floor graphics on Arena-style exhibits	(x)	x	(x)
- patterns of use re: three exhibit styles (cards, intimate, Arena) including dwell time and use/non-use of multiple versions of a single style			x



Visitor & Participant Impacts by NSF ISE Category (provided by staff)	Exhibition Comparison Study (exit interviews)	Exhibit Comparison Study (intercept interviews)	Tracking & Timing
- visitors interact with strangers while engaging with SoS exhibits	x	x	
Behavior:			
- changes in behaviors relating to resource use and sharing, especially among Experimonth participants	(x)	(x)	
- intention to change such behaviors among exhibit users	(x)	(x)	
- intention to take others' perspectives into account in future sharing interactions	(x)	(x)	
Skills:			
- Practicing the skill of metacognition/self-reflection in realizing how one thinks and acts regarding resource sharing	x	x	
- Practicing the skill of mentally modeling the implications of local resource behaviors when they are scaled up to global levels	(x)	(x)	
- practicing skill of taking others' perspectives into account while sharing resources with others	(x)	x	

Studies

Several evaluation studies of exhibits on the floor at the Exploratorium were conducted during February – May of 2015. For detailed information about the studies, and interview protocols, please see Appendix C.

- Tracking and Timing using video footage from ceiling cameras (n=200)
- Exhibition Comparison Study, a quasi-experimental study using exit interviews at SoS (n=100) and a control site, Light and Sound in the Crossroads gallery (n=100)
- Exhibit Comparison Study, intercept interviews at four Card Sort (n=50) and four Arena style exhibits (n=50) within SoS

Because intercept interview participants used only Card Sorts and Arena exhibits, and exit interview respondents could have used any of the SoS exhibits, findings are presented for each data set separately.

SoS Exhibits - Summary of Key Findings

Goal: Assess the success of the exhibits in fostering metacognition and helping participants make conceptual connections to real-world issues of cooperation and resource sharing

Almost every SoS exhibition visitor who used exhibits which focus on sharing was moved to consider sharing resources in some way. Among intercept interview participants at Public/Private and TextFish (n=25), 76% did so with metacognition (CP1 and/or CP2). All of the exit interview participants who evidenced CP1 and/or CP2 about sharing-related issues (28% of 100) had used Public/Private, TextFish, Helping and Wealth and/or the Give and Take Table.

SoS exhibit users contemplated resource sharing at personal, societal and global levels. The Public/Private exhibit forced players to ponder why and how society shares resources such as utilities and medical care. They often deliberated about their own priorities and beliefs, as well as those of the people in their social group. Public/Private users also reflected on governmental policies and the socio-economic roots of uneven access. TextFish was effective at getting people to consider personal and societal behaviors in



relation to the global problem of overfishing. Viewing the Helping and Wealth compelled visitors to think about differences in giving across the globe.

Impact: Interest in and knowledge of different ways of cooperation, competing, or sharing

Majorities of exit interview participants (74%) and intercept interview participants (61%) evidenced interest in cooperation competition and/or sharing in some way while using SoS exhibits. Most of this interest was demonstrated by people considering their own behavior in the games, and reflecting on what type of competitor or collaborator they believe themselves to be. However, many respondents made similar assessments of the people in their social group. Many different exhibits contributed to these musings by respondents.

Respondents also thought broadly about human nature and competition. In some cases, they recognized that in addition to one's natural inclinations, people's competitive behaviors can vary under different conditions. For instance, the high energy of a lot of people playing Red/Blue can get people more excited and competitive. Sort and Switch users mused about the competitive or cooperative nature of men and women.

Public/Private users questioned the way our society is structured around utilities, why some things are free and others are not, and factors impacting access to resources. For some people, this was the first time they had stopped to think about these issues. Public/Private users were the only respondents to reference politics or political affiliation. Helping and Wealth users considered the human influence on decision making at a policy level.

Impacts: Interest in and awareness of collaborative problem solving & Engagement with interpersonal interactions involving sharing and problem solving

Overall, respondents evidenced attention to collaborative problem solving or engagement with related interpersonal interactions less frequently than they considered personal styles of competing or collaborating. However, certain exhibits do have these impacts. Arena players contemplated teamwork and the difficulties of having to coordinate with others. Team Snake players thought very specifically about needing to communicate in order to work in concert; something that can be hard to do in stressful conditions. Team Snake players also mused about leadership; good leadership is necessary to play the game well.

Using or watching Be Kind, Rewind, Give and Take Table, or Donation with Contemplation moved people to think about sharing with, or being kind to, others. They felt good about rewinding the video for others (at the prompt given by the exhibit), or happy about seeing people make a donation, or paused to consider personal motivations to give or not. Most musings about sharing resources were engendered by TextFish and Public/Private, and were not at a personal level.

Explorations of Social Behavior watchers related easily to interpersonal dynamics presented in the marital argument and social dilemma videos, e.g., the smoky room. Please see below for more about social interactions.

Impact: Interest in factors affecting social interactions

Respondents who used specific exhibits were very likely to consider social interactions in different contexts. All of the exit interview participants who thought about social dynamics (25%), or stereo typing or prejudice (26%) had attended Sort and Switch, Trading Places,¹ Explorations of Social Behavior and/or

¹ Trading Places was originally developed for the Exploratorium's Mind exhibition (NSF 0307927). Its content and format inspired further experimentation and prototyping during exhibit development for Science of Sharing, leading



Who Do You Think I Am. Among intercept interview participants, 10% thought about social dynamics. Another 17% specifically contemplated stereotyping, all of whom had used Sort and Switch or Trading Places.

The exhibit, Who Do You Think I Am, brought to the fore the reality and dangers of first impressions and prejudice. Social experiment videos at Explorations of Social Behavior compelled viewers to think hard about what they would do in those situations, both as regular people or as professionals. Considering what they would do prompted people to acknowledge their own way of operating in groups or with authority. It was disturbing for people to think that they might not do the right thing.

Trading Places, Freeloader, and Team Snake gave respondents a chance to reflect on how their families operate, particularly regarding communication and collaboration, and who functions as the natural leader in their family group. Marital arguments at the Explorations of Social Behavior are easy for visitors to relate to their own lives, including learning about constructive arguments.

Common Knowledge and Freeloader users mused about the difficulties of sharing ideas with people in daily life; because people are individuals they think differently from each other.

Impact: Visitors observe and discuss human behavior

Of the 68 exit interview participants who paused to watch other visitors use exhibits, 26% did so because the people using it seemed engaged. Of the 15 intercept interview respondents who stopped to watch others, 38% stopped because the users seemed to be engaged or having fun.

SoS visitors were easily attracted to Red/Blue because of the often loud and raucous behavior there. Many people were fascinated to observe the players. Noticing the intensity of participants' engagement made observers think about how and why Red/Blue was so compelling. They marveled at the "crazy" level of competition, especially given that winning seemed to be such a small reward.

Helping and Wealth readers checked the map to find out where around the world people are kind or mean. The meanness of New Yorkers featured in several comments.

Respondents studied the behaviors and reactions of people at Trust Fountain, wondering if they would get a squirt and thinking about the dynamics of the players, which might influence their choices.

Impact: Visitors interact with strangers while engaging with SoS exhibits

About one quarter of exit interview participants reported that they interacted with a stranger in the SoS exhibition (26%); 15% of intercept interview respondents did so.

Red/Blue and Team Snake generated the most contact between strangers. Both exhibits got people to recruit strangers to join the team, and to cheer for each other. Red/Blue players tended to acknowledge each other, and sometimes laughed about the game and/or joined the play or took turns, but didn't converse much. Team Snake users verbally communicated with each other to coordinate game play.

TextFish players made contact with strangers to learn about the game or identify other players ("were you the ones...?"). Strangers also played together sometimes at Freeloader and Career Criminal, which for some made the game more interesting.

eventually to Sort and Switch, Public Private, and Making Meaning. As staff prepared to open the final Science of Sharing exhibition to the public, they updated the design of Trading Places to harmonize it with SoS exhibits.



Impacts: Practicing the skill of metacognition/self-reflection in realizing how one thinks and acts regarding resource sharing & Practicing skill of taking others' perspectives into account while sharing resources with others

Among exit interview participants 22% metacognated about other's perspectives regarding sharing. That group includes a subset of respondents who also metacognated about their own mindset or processes regarding sharing (13% of the full sample). A similar pattern exists among intercept interview participants: 18% considered perspectives of others regarding sharing; 10% also considered their own thoughts and behaviors.

Exhibit goers who attended TextFish Making Meaning, Public/Private, and/or the Helping and Wealth thought about resource sharing quite a bit. Public/Private players often reflected on not just how society shares resources, but how they personally think things should be done. TextFish respondents thought about greed noting that people can be greedy, even if that isn't their intent, because of a scarcity mentality and/or the excitement of competition. A few Making Meaning cards prompted users to think about resource sharing individually or at a societal level. Visitors also considered the "tragedy of the commons" noting that as a society we often make decisions based on emotion even when appropriate data are available.

Respondents considered the perspectives of others in the context of cooperation/competition and social situations more than in the context of sharing. Arena exhibit users recognized and thought about the fact that other people's perspectives are an important part of collaboration and competition, since they need to be understood as they can influence others' choices or behaviors. Familiarity and trust among participants, or a lack thereof can also affect this dynamic; things which Trust Fountain and Career Criminal players contemplated as they anticipated a possible squirt or jail sentence.

Visitors who attended the Helping and Wealth and/or the Explorations of Social Behavior empathized with the people they were reading about or watching in the videos. They readily imagined themselves in the place of people in the videos, wanting someone to help the man in the street, or wondering what they would do in the social experiment situations. Respondents were moved to consider why people behave the way they do. Specifically, they considered why people might behave in a mean way.

Trading Places, Sort and Switch, and Who Do You Think I Am users also scaled up to stereotyping at a societal level, noting that it affects all aspects of life and is responsible for prejudice, income inequality, etc. Difficulty sorting cards in Trading Places and Sort and Switch forced visitors to ponder how deeply ingrained gender biases are, and how well society is—or isn't—moving past them.

Impacts: Interest in and understanding of connections between local/individual sharing and global issues of resource allocation (scaling up) & Practicing the skill of mentally modeling the implications of local resource behaviors when they are scaled up to global levels

Among exit interview participants, 10% thought deeply about personal/local behaviors and their implications on a global scale; 9% of intercept interview participants did so. Most musings about resource sharing on a personal or local level connected to the wider world related to eating seafood and overfishing the world's oceans (TextFish users), and large-scale resource sharing of utilities, medical care, etc. (Public/Private).

TextFish players readily associated their own eating and shopping habits, even the contents of their refrigerator at home, to global-scale issues of overfishing. Other users considered overfishing from a less personal level, referring to our growing human population. Public/Private users reported actively pondering the way our society is structured around resources and why some things are free and others are not. They also applied those issues to their own situations and explored reasons for uneven access.



Impact: Awareness that SoS exhibits are different from others

When discussing why they found the SoS exhibition to be engaging, 40% touched on something specific to SoS, including that the exhibits enable people to interact with each other, or learn about one's self, in addition to other content-specific references. A few also stated that SoS exhibits were unusual or different than what they had used elsewhere in the Exploratorium, or at any other museum; though this exact question was not posed to respondents.

Impact of floor graphics on Arena-style exhibits

We have no data on the use of or impact of floor graphics at the Arena exhibits. Tracking and timing videos could not detect this and respondents did not mention them. Interviews did not ask about them specifically.

Goal: Assess the success of the exhibits in fostering interest in science and/or the social science research associated with the exhibits

Impact: Awareness that behavioral research explores these issues

Exit interview participants more often keyed in on this awareness than did intercept interview respondents; 14% of exit respondents related SoS exhibits to social science, psychology, and/or game theory, 6% of intercept interview participants did so. Most of these respondents explained that they had studied psychology, or were familiar with game theory, and found the SoS project's treatment of that content intriguing or satisfying.

Goal: Assess patterns of use of SoS exhibits

Exhibition Usage

- Average total dwell time in SoS was 9.43 minutes; excluding interstitial time, average dwell time was 7.78 minutes.
- Based on an average full dwell time of 9.43 minutes, the average sweep rate through this 2,700 square foot exhibition is 286 square feet per minute.²
- On average, visitors went to 6.34 exhibits during their visit to SoS. Filtering for unique exhibits (excluding repeat visits to individual exhibits), visitors went to an average of 4.99 distinct exhibits during their visit.
- The most popular exhibits, measured by number of visitors who observed or engaged with them, were
 - TextFish (85, 42.5%);
 - Donation with Contemplation (73, 36.5%);
 - Career Criminal (72, 36%).
- Exhibits with the greatest average holding times were
 - Making Meaning (3.47 minutes);
 - Explorations of Social Behavior (3.09 minutes);
 - Freeloader (2.73 minutes).

² SoS visitors spend slightly more time in the exhibition than the 300 square feet per minute considered to be the minimal threshold for "effective" exhibits per Beverly Serrell's 51% Solution. The porous nature of the SoS exhibition space, and long dwell times at individual exhibits make SoS ill-suited to the full analysis of the 51% Solution.

Beverly Serrell, *Paying Attention: Visitors and Museums Exhibitions* (Washington DC: American Association of Museums, 1998), 72

Wendy Meluch, [The Mind Collection Summative Evaluation](#) (Visitor Studies Services, Novato, CA, prepared for Exploratorium, San Francisco, 2008), 64



- The most time any one visitor spent at an exhibit was observed to be 25.95 minutes at Explorations of Social Behavior.

Do visitors use the SOS exhibition differently when children are present/absent?

No differences in dwell times or patterns of exhibit use between adult-only (evening) and all-ages (daytime) audiences reached statistical significance.

Patterns of use regarding Card Sorts and Arena exhibits, including dwell time and use/non-use of multiple versions of a single style

Holding times for Card Sorts and Arena style exhibits were not significantly different, though some patterns of use were. Overall, visitors were

- more likely to observe Arena exhibits than to observe Card Sort exhibits (p-value < .001);
- more likely to observe Arenas before engaging with them, compared to Card Sort types (p-value = .007);
- more likely to engage with Card Sort types without ever observing them, compared to Arenas (p-value < .001).

Goal: Assess the difference in visitor impacts of SoS and a control exhibit

SoS v. Control Overall: statistically significant findings

A statistical analysis of exit interview findings revealed significant differences between SoS and Control respondents on several key issues. SoS visitors experience these things more than Control visitors:

- exhibit-induced CP2 during the interview (Q2; p=.04);
- metacognition about their own/others sharing/collaborating/competing within the games/exhibits (Q5; p<.001);
- metacognition about others' mindsets or cognitive process regarding sharing resources (Q15; p<.001);
- metacognition about their own or others' stereotyping, prejudice or gender bias (Q17; p<.001);
- metacognition about others' thoughts or behavior regarding cooperation/competition outside of the games/exhibits (Q19; p<.001);
- consideration of wider scale impacts based on local behaviors or issues related to resource sharing (Q20; p<.001);
- being aware of their own thinking at some time while in/using exhibit (Q26; p<.001);
- rate the exhibit more highly than Control regarding causing them to scale up to the world outside of the museum (Q29; p<.001).

Visitors Rate SoS higher than Control for causing them to scale up

Compared to the control, visitors self-report that SoS was more effective at helping them think of things outside the museum. SoS evening visitors rated the exhibition more highly in this regard than did daytime visitors.³ The following comparisons were significant:

³ We tested for a possible interaction effect between SOS/Control and Daytime/Evening conditions using multiple regression with the dependent variable being the visitor rating of the scaling up question and independent variables being (1) Control/SOS, (2) Day/Evening, and (3) interaction between Control/SOS and Day/Evening. The results showed that the main effect of Condition (SOS/Control) is positive and significant (p = .0002). Neither the main effect of Time (evening/day) nor the Condition/Time interaction is significant. Results indicate that the differences in ratings



- SOS (3.27) and Control (2.47), ($p < .001$)
- SOS day (3.34) and Control day (2.36), ($p = .001$)
- SOS evening (3.20) and Control evening (2.59), ($p = 0.02$)

Goal: Assess the difference in visitor impacts of SoS in adult-only and mixed audience conditions

SoS Daytime (mixed audience) v. SoS Evening (adult audience): statistically significant findings

Findings confirm that daytime SoS visitors are more likely than evening SoS visitors to

- metacognate about human behavior or social interactions (Q7; $p = 0.01$);
- acknowledge wide scale issues of competition for resources (Q21; $p = 0.03$);
- pause to watch others use the exhibit (Q24; $p = 0.01$).

correspond with the difference in the SOS/Control condition, but not on the Day/Evening condition or an interaction between the two.

SoS Exhibits - Detailed Findings

SoS Comparisons with Control

Impacts – statistically significant findings

A statistical analysis of exit interview findings revealed significant differences between SoS and Control respondents on several key desired impacts. We ran additional analyses to see if these differences were moderated by day/evening conditions and it appears they are not. First, differences in the frequencies of these impacts are not significantly different between SoS daytime and SoS evening audiences. Second, we compared SoS evening audiences with Control evening audiences, and then SoS day audiences with SoS evening audiences. In both cases, the pattern of significant differences is the same as when we compared SoS and Control with all audiences.

Taken together, these findings confirm that SoS visitors experience the following desired impacts more than Control visitors, likely because of something about their exhibit experience:

- metacognate about their own/others sharing/collaborating/competing within the games/exhibits (Q5; $p < .001$)
- metacognate about others’ mindsets or cognitive process regarding sharing resources (Q15; $p < .001$)
- metacognate about their own or others’ stereotyping, prejudice or gender bias (Q17; $p < .001$)
- metacognate about others’ thoughts or behavior re: cooperation/competition outside of the games/exhibits (Q19; $p < .001$)
- consider wider scale impacts based on local behaviors or issues related to resource sharing (Q20; $p < .001$)
- feel like they are aware of their own thinking at some time while in/using exhibit (Q26; $p < .001$)
- rate the exhibit more highly than Control regarding causing them to scale up to the world outside of the museum (significant at less than (Q29; $p < .001$)

Evidence of exhibit-induced CP2 voiced at some point during the exit interview also revealed a significant difference between SoS respondents and Control overall (Q2). However, the effect is only significant at .04 and it is small (a difference of 11 people). Additionally, the difference between SoS and Control did not hold up for the Day-only and Evening-only comparisons, as found in other questions. So, while this question resulted in significantly different quantities, it is a weaker effect than those listed above.

Engagement Ratings

Ratings about how engaging exit survey respondents found the exhibitions to be were not significantly different (SoS mean 4.21; Control mean 4.3), but there were a few differences in why respondents rated the exhibits the way they did. Not surprisingly, that the exhibits were fun, interesting and/or enjoyable was the most frequent reason for high marks in both exhibitions. The interactive nature of the exhibits, that one can play with them also ranked among the top three reasons for high engagement scores in both exhibitions.

One third of SoS users gave a high engagement rating because the exhibits in that area enabled them to interact with other people, something mentioned by very few Control respondents. A few SoS respondents took points off for needing to have a partner to use those exhibits. Control exhibits seemed to be more visually attractive to respondents, who stated they looked more fun or exciting than SoS exhibits.

	Code	Description	SoS (n=100)	Control (n=100)
I scored it highly	I	They were fun/interesting, I enjoyed them	61	72
	K	The exhibits enable interaction with other people.	33	7
	J	The exhibits are interactive, you can play with them	24	36

	Code	Description	SoS (n=100)	Control (n=100)
because... What made it engaging was...	M	Self-reflection, learning about self	9	2
	N	Content-specific: SoS related (apart from self-reflection above)	7	1
	H	They were attractive or looked fun, exciting, they drew me in	2	14
	Q	Other	1	15
	L	These are better than others in the museum	0	3
	O	Content-specific: Control-related	0	23
I took off points because... It would have been a higher score except for...	A	They were just meh or boring	22	19
	G	Other	10	5
	E	Some specific lacking, or complaint about element(s)	9	2
	C	You need a partner for them	8	0
	B	They were not attractive or exciting looking	1	0
	D	Others in the museum are better	0	5

Pausing to watch others

The number of people who reported that they paused to watch other people in the two different exhibitions do not show a statistically significant difference (SoS 68; Control 76). Two of the top four reasons for pausing to watch others are the same for both groups: because the respondent wanted to see other peoples’ strategies, reactions and/or experiences; and because the people seemed engaged. SoS visitors more often described wanting to figure out how to use/do the exhibit. Control visitors seemed more likely to be focused on watching others in their group, comparing their performance against others’, and watching others while waiting for a turn.

Reason to pause and watch others (up to 3 per respondent)		SoS Exit (n=68)	Control Exit (n=76)
W7	I wanted to see others’ strategies, reactions, experiences	60%	51%
W6	I wanted to figure out how to use it or do it	28%	21%
W4	They seemed engaged (laughing, talking, etc.)	26%	38%
W5	It looked interesting, I was curious about the game	22%	32%
W3	The noise attracted my attention	16%	1%
W1	My social group, we were doing things together	12%	21%
W2	Waiting for a turn	7%	12%
W8	I wanted to compare my performance with others’	6%	25%
W9	Reference to white lines/labels on the floor	0%	0%
W10	Other	19%	8%

SoS Day v. SoS Evening

Three questions had a significant result for the SoS daytime and evening respondent comparisons at a confidence level of .03 or higher. The responses to these questions demonstrate that more people in day than evening groups express metacognition, thinking about resource sharing, and watching others. In other words, something about attending SoS during the day causes people to experience these reactions more than they do during the evening.

Findings confirm that daytime SoS visitors are more likely than evening SoS visitors to

- metacognate about human behavior or social interactions (Q7; p=0.01);



- think about wider scale resource sharing and acknowledge that these happen outside the museum without directly associating them with local behaviors (Q21; p:0.03);
- pause to watch others use the exhibit (Q24; p= 0.01).

Visitors Rate SoS higher than Control for making them scale up

One of the ratings question had significant differences between groups that we studied: “Did these exhibits make you think of things outside the museum?” Compared to the control, visitors self-report that SoS was more effective at helping them think of things outside the museum. SoS evening visitors rated the exhibition more highly in this regard than did daytime visitors.⁴

The following comparisons were significant:

- SOS (3.27) and Control (2.47), (p< .001)
- SOS day (3.34) and Control day (2.36), (p= .001)
- SOS evening (3.20) and Control evening (2.59), (p= 0.02)

⁴ We tested for a possible interaction effect between SOS/Control and Daytime/Evening conditions, using multiple regression, with the dependent variable being the visitor rating of the scaling up question and independent variables being (1) Control/SOS, (2) Day/Evening, and (3) interaction between Control/SOS and Day/Evening. The results showed that the main effect of Condition (SOS/Control) is positive and significant (p = .0002). Neither the main effect of Time (evening/day) nor the Condition/Time interaction is significant. Results indicate that the differences in ratings correspond with the difference in the SOS/Control condition, but not on the Day/Evening condition or an interaction between the two.



SoS – Control Comparisons Data Table

Questions for the Data		Compare SoS (n=100) and Control (n=100)			Compare SoS day (n=50) and SoS evening (n=50)			Compare SoS evening (n=50) and Control evening (n=50)			Compare SoS day (n=50) and Control day (n=50)		
At any point in the interview, how many respondents evidenced this as a part of their exhibit(ion) experience... (not resulting from the interview)		SoS	Control	p-value	SoS_day	SoS evening	p-value	SoS evening	control evening	p-value	SoS day	control day	p-value
Q1	evidence CP1?	56	49	0.32	25	31	0.23	31	31	1.00	25	18	0.16
Q2	evidence CP2?	89	78	0.04	45	44	0.75	44	37	0.08	45	41	0.25
Q3	evidence CP1 and/or CP2?	92	91	0.80	47	45	0.47	45	45	1.00	47	46	0.70
Q5	address their own/others: sharing/collaborating/competing within the games/exhibits (with mc)?	74	14	< .001	40	34	0.17	34	5	< .001	40	9	< .001
Q7	address human behavior or social interactions (with mc)?	30	6	< .001	22	8	0.01	8	3	0.11	22	3	< .001
Q11	address their own, others: cognitive process (not specific to sharing/competing/etc.) (with mc)?	88	79	0.09	45	43	0.54	43	40	0.43	45	39	0.10
Q13	scale up re: own mindset/behaviors re: sharing resources (with mc)?	13	0	< .001	9	4	0.13	4	0	0.04	9	0	0.01
Q15	scale up re: others mindset/process re: sharing resources (with mc)?	22	0	< .001	13	9	0.34	9	0	0.01	13	0	< .001
Q17	think about their own or others stereotyping, prejudice or gender bias (with mc)?	26	1	< .001	13	13	1.00	13	0	< .001	13	1	< .001
Q19	scale up re: others and cooperation/competition (with mc)?	34	6	< .001	17	17	1.00	17	4	0.01	17	2	< .001
Q20	think about wider scale impact based on local behaviors or issues related to resource sharing (with mc)?	10	1	< .001	7	3	0.19	3	0	0.08	7	1	0.03

Questions for the Data		Compare SoS (n=100) and Control (n=100)			Compare SoS day (n=50) and SoS evening (n=50)			Compare SoS evening (n=50) and Control evening (n=50)			Compare SoS day (n=50) and Control day (n=50)		
At any point in the interview, how many respondents evidenced this as a part of their exhibit(ion) experience... (not resulting from the interview)		SoS	Control	p-value	SoS_day	SoS evening	p-value	SoS evening	control evening	p-value	SoS day	control day	p-value
Q21	think about wider scale resource sharing w/out directly associating it with local behaviors, e.g. acknowledge that these happen outside the museum (with or without mc)?	19	0	< .001	14	5	0.02	5	0	0.02	14	0	< .001
Q22	think about social interactions outside of the Museum walls (with our without mc)?	25	5	< .001	15	10	0.25	10	3	0.0377	15	2	< .001
Q24	pause to watch others use an exhibit?	68	77	0.16	40	28	0.01	28	30	0.69	40	46	0.09
Q25	interact with people outside of their social group?	26	16	0.08	15	11	0.37	11	8	0.45	15	8	0.10
Q26	self-report being aware of their own thinking at some time while in/using exhibit?	82	69	0.03	44	37	0.08	37	35	0.66	44	33	0.01
Q27	felt like they learned about self or others (Exit interviews: Yes/No)?	78	72	0.33	37	40	0.48	40	32	.08	37	40	0.48
Q28	Rating re: was this area engaging?	4.21	4.3	0.35	3.46	3.28	0.39	4.24	4.39	0.26	4.18	4.22	0.78
Q29	Rating re: did these exhibits make people scale up?	3.27	2.47	< .001	3.34	3.20	0.62	3.20	2.59	0.02	3.34	2.36	< .001

Visitor Use of the SoS Exhibition – Overall and With/without Children Present

Dwell Time

On average, visitors spent 9.43 minutes in SoS, with the shortest time less than 1 minute, and the longest time about 45 minutes.⁵ Of the time visitors spent in SoS, on average 1.65 minutes were not spent observing or engaging with any exhibits. When we subtract interstitial time, the average active time spent in SoS was 7.78 minutes. Differences between evening and daytime visitors did not reach statistical significance.

Based on a dwell time of 9.43 minutes, the average sweep rate through this 2,700 square foot exhibition is 286 square feet per minute. SoS visitors spend slightly more time in the exhibition than the minimum average of 300 square feet per minute considered the threshold for “effective” exhibits per Beverly Serrell’s 51% Solution.⁶ The porous nature of the SoS exhibition space, and long dwell times at individual exhibits make SoS ill-suited to the full analysis of the 51% Solution.⁷

SoS Exhibition Dwell Time (n=200)			
	Full Time	Interstitial Time	Active Time
Mean	9.43	1.65	7.78
Median	7.1	1.32	6.08
Min	0.83	0.17	.25
Max	45.5	11.82	41.82

If a visitor returned to SoS, their cumulative dwell time across visits was used.

Repeat SoS Exhibition Visits

Once they had left, 12% of visitors came back into SoS during the 10-minute post-exit observation period. Differences between evening and daytime visitors did not reach statistical significance.

Repeat SoS Exhibition Visits (n=200)			
Frequency of Repeat SoS Exhibition Visits		Number of Visits into SoS	
Mean	1.14	1	88%
Median	1	2	11%
Min	1	3	1%
Max	4	4	1%

Number of Exhibits Visited

On average, visitors went to 6.24 exhibits during their visit to SoS. Filtering for unique exhibits (excluding repeat visits to individual exhibits), visitors went to an average of 4.99 distinct exhibits during their visit. Differences between evening and daytime visitors do not reach statistical significance.

⁵ Dwell times of less than one minute are not usually included in a tracking and timing sample; in this case the subject did engage with an exhibit during the .83 minute visit so it was kept in the sample.

⁶ Beverly Serrell, *Paying Attention: Visitors and Museums Exhibitions* (Washington DC: American Association of Museums, 1998), 72

⁷ Wendy Meluch, *The Mind Collection Summative Evaluation* (Visitor Studies Services, Novato, CA, prepared for Exploratorium, San Francisco, 2008), 64

Number of Exhibits Uses by Each Case (n=200)		
	Including repeat visits to the same element	Unique exhibit visits
Mean	6.24	4.99
Median	6.0	5.0
Min	1	1
Max	21	11

Exhibit-specific Use by Exhibition Visitors– Number of Exhibit Visits and Repeat Visits

The most popular exhibits, measured by number of visitors who observed or engaged with them were: Red/Blue (85, 42.5%), TextFish (85, 42.5%), Donation with Contemplation (73, 36.5%), and Career Criminal (72, 36%). Red/Blue, Career Criminal, and Explorations of Social Behavior all had at least 5 visitors who came back 3 or more times.

Number of visitors to each exhibit (n=200)					
Type/Exhibit	Total # visitors who visited the exhibit	# Visitors who visited . . .			
		1 Time	2 Times	3 Times	4+ Times
Arena					
Freeloader	63	42	21		
Red/Blue	85	56	23	1	5
TextFish	85	70	14	1	
Team Snake	48	39	8	1	
Card Sort Type					
Making Meaning	32	25	5	2	
Public Private	37	31	6		
Sort & Switch	48	39	9		
Trading Places	46	40	5	1	
Other					
Career Criminal	72	42	25	4	1
Donation with Contemplation	73	68	5		
Common Knowledge	48	40	7	1	
Helping and Wealth	15	15			
Give & Take Table	67	64	3		
Collaborative Shapes	43	39	4		
Be Kind Rewind	69	54	13	1	1
Trust Fountain	54	40	12	2	
Explorations of Social Behavior	64	42	17	4	1
Who Do You Think I Am	50	40	10		

More daytime visitors went to several exhibits than evening visitors (18 daytime visitors to Trust Fountain compared to 8 evening; 16 daytime visitors to Collaborative Shapes compared to 8 evening; 5 daytime visitors to Helping and Wealth compared to 1 evening). However, we did not test all of the exhibits for significance, because without a clear hypothesis for why some exhibits would attract more daytime or evening visitors, we run a high risk of a Type I error (finding significance when the difference was due to chance).

Number of visitors to each exhibit - Evening and Daytime compared		
Type/Exhibit	Evening (n=50)	Daytime (n=50)
Arena		
Freeloader	17	18
Red/Blue	21	23
TextFish	26	26
Team Snake	11	12
Card Sort Type		0
Making Meaning	8	9
Public Private	9	9
Sort & Switch	15	11
Trading Places	13	10
Other		
Career Criminal	18	19
Donation with Contemplation	17	17
Common Knowledge	13	15
Helping and Wealth	1	5
Give & Take Table	17	19
Collaborative Shapes	8	16
Be Kind Rewind	22	17
Trust Fountain	8	18
Explorations of Social Behavior	11	18
Who Do You Think I Am	9	15

Individual Exhibit & Exhibit-type Holding Times among Exhibition Visitors

When looking at exhibit holding times for all visitors, Making Meaning had the highest average dwell time (3.47), followed by Explorations of Social Behavior (3.09), and Freeloader (2.73). The most time any one visitor spent at an exhibit was 25.95 minutes at Explorations of Social Behavior.

We grouped together visits to Card Sort and Arena exhibits from the full sample (n=200) to see if there were differences between the types. Differences did not reach statistical significance.

We also compared aggregate holding time at Card Sort and Arena exhibits for daytime and evening visitors. On average, daytime visitors spent more time at Arena exhibits (3.14 minutes) than evening

visitors did (2.13). Daytime visitors spent less time at Card Sort exhibits (2.96 minutes) than evening visitors (3.83). Differences did not reach statistical significance.

The following table shows the total holding time for each exhibit (cumulative number of minutes spent across all 200 cases at the exhibit). Also shown are the mean, median, min, and max minutes spent at an exhibit. These statistics were calculated using each cases’ cumulative visits to an exhibit as one visit (e.g. if someone returned to an exhibit multiple times, the number of minutes spent was summed and treated as one visit).

Holding Times for Individual Exhibits, and Aggregate Holding Times in Minutes for Card Sorts and Arenas (n=200)					
Type/Exhibit	Total # visitors who visited the exhibit (=n)	Mean	Median	Min	Max
Arena					
Freeloader	63	2.73	2.27	0.07	15.42
Red/Blue	85	1.41	0.68	0.07	14.62
TextFish	85	1.05	0.42	0.08	6.53
Team Snake	48	1.79	1.47	0.08	9.68
Arena Aggregate	165	2.83	1.93	0.08	30.03
Card Sort Type					
Making Meaning	32	3.47	4.01	0.05	12.52
Public Private	37	2.13	1.60	0.05	7.72
Sort & Switch	48	1.42	1.18	0.05	4.32
Trading Places	46	1.75	1.34	0.05	7.92
Card Sort Type Aggregate	104	3.25	1.71	0.05	18.05
Other					
Career Criminal	72	1.80	1.80	0.05	5.13
Donation with Contemplation	73	0.37	0.25	0.03	2.82
Common Knowledge	48	2.59	2.83	0.05	7.33
Helping and Wealth	15	0.59	0.52	0.07	1.42
Give & Take Table	67	0.43	0.33	0.05	2.73
Collaborative Shapes	43	0.66	0.37	0.05	2.53
Be Kind Rewind	69	1.34	1.17	0.05	4.12
Trust Fountain	54	1.05	0.85	0.07	2.82
Explorations of Social Behavior	64	3.09	1.65	0.07	25.95
Who Do You Think I Am	50	1.15	0.72	0.10	4.92

Comparison of Card Sort and Arena Exhibits Sequence of Use among Exhibition Visitors

Repeat use of the same exhibit type

Looking at differences between evening and daytime visitors, we see that evening and daytime visitors are equally likely to attend to more than one Card Sort exhibit. They are also equally likely to attend to more than one Arena exhibit. That is, the presence or lack of children seems to have no relationship to the likelihood of returning to a given type of exhibit.

Patterns of use around observing and then engaging with Card Sorts and Arenas

We examined 3 different patterns of observing/engaging for the full sample of 200, and for comparison between, with and without children present:

1. Visitors observe an exhibit type, but never engage with that type.
2. Visitors observe an exhibit type before their first engagement with that type.
3. Visitors engage with an exhibit type, and never observe it.

No differences between evening and daytime visitors reached statistical significance. For the full sample of 200 visitors, the following patterns of observing and engaging with Card Sort and Arena exhibits were statistically significant. Overall, visitors were

- less likely to observe Card Sort type exhibits (39.18% compared to 54% for Arena, p-value < .001);
- more likely to observe Arenas before engaging with them, compared to Card Sort types (32.12% for Arena compared to 17.31% for Card Sort, p-value = .007);
- more likely to engage with Card Sort types without ever observing them, compared to Arenas (46.15% for Card Sort compared to 16.96% for Arena, p-value < .001).

Percentages in the following tables are calculated, not by the total sample but by the subset of visitors who had some interaction with that type of exhibit. In other words, “Of visitors who had some interaction (observing or engaging) with an Arena exhibit, how many observed but never engaged with Arena exhibits?”

How often visitors observe Arena exhibits compared to Card Sort exhibits*						
	All (%)	All (n)	Thu (%)	Thu (n)	Sun (%)	Sun (n)
Arena	54%*	199	48%	46	61%	66
Card Sort	39%*	76	35%	18	43%	21

*For each recorded interaction with an exhibit type, the number and percent of times that interaction was Observe (rather than Engage).

Patterns of observing and then engaging with exhibits, full sample						
Subset of the Full Sample (n=200): Visitors who had some interaction (observing or engaging) with Arena exhibits, or Card Sort exhibits						
	Observe exhibit type, but never engage with type		Observe type before engaging with type		Engage with exhibit type, but never observe type	
	%	n	%	n	%	n
Arena (n=165)	34%	56	32%	53	17%	28
Card Sort (n=104)	28%	29	17%	18	46%	48
p-value	.30		.007*		<.001*	

T-tests comparing Card Sort and Arena Exhibits (full sample, n = 200)	Minutes; Percent		p-value
	Arena	Card Sort	
Exhibit holding time means in minutes	3.25	2.83	0.37
How often visitors observe exhibits	54%	39%	<.001
How often visitors return to Card Sort or Arena exhibits	50%	39%	.08
Observe exhibit type, but never engage with type	34%	28%	.30
Observe type before engaging with type	32%	17%	.007
Engage with exhibit type, but never observe type	17%	46%	<.001

Card Sort and Arena Exhibits - Impacts comparisons

Card Sorts are more effective at ...

Data confirm that Card Sort exhibits cause users to experience these things at the time of use more than Arena exhibits:

- Secondary Cognitive Processing (Code 2; Q2) (p=0.01)
- metacognate about their own or others’ cognitive process (not specific to sharing/competing/etc.) (Q11) (p=<.001)
- metacognate about their own or others’ stereotyping, prejudice or gender bias (Q17) (p=<.001)
- rate the exhibit more highly than Arena users regarding causing them to scale up to the world outside of the museum (Q29) (p=0.002)

Arena style exhibits are more effective at...

Data confirm that Arena exhibits cause users to experience these things more than Card Sort exhibits:

- metacognate about their own/others sharing/collaborating/competing within the games/exhibits (Q5) (p=<.001)
- metacognate about wider scale impacts based on local behaviors or issues related to resource sharing (with, or without mc)? (Q20) (p=0.01)
- pause to watch others at the exhibit (Q24) (p=0.002)
- interact with people outside of their social group (Q25) (p=<.001)

Card Sort – Arena Comparisons Data Table

Question for the Data		Compare Card Sort (n=50) and Arena (n=50)		
At any point in the interview, how many respondents evidenced this as a part of their exhibit(ion) experience... (not resulting from the interview)		Card Sort	Arena	p-value
Q1	evidence CP1?	26	30	0.43
Q2	evidence CP2?	47	38	0.01
Q3	evidence CP1 and/or CP2?	50	48	0.16
Q5	address their own/others: sharing/collaborating/competing within the games/exhibits (with mc)?	20	41	<.001
Q7	address human behavior or social interactions (with mc)?	3	2	0.65
Q11	address their own, others: cognitive process (not specific to sharing/competing/etc.) (with mc)?	46	29	<.001

Question for the Data		Compare Card Sort (n=50) and Arena (n=50)		
		Card Sort	Arena	p-value
At any point in the interview, how many respondents evidenced this as a part of their exhibit(ion) experience... (not resulting from the interview)				
Q13	scale up re: own mindset/behaviors re: sharing resources (with mc)?	5	5	1.00
Q15	scale up re: others mindset/process re: sharing resources (with mc)?	10	8	0.60
Q17	think about their own or others stereotyping, prejudice or gender bias (with mc)?	17	0	< .001
Q19	scale up re: others and cooperation/competition (with mc)?	12	21	0.06
Q20	think about wider scale impact based on local behaviors or issues related to resource sharing (with mc)?	1	8	0.01
Q21	think about wider scale resource sharing w/out directly associating it with local behaviors, e.g. acknowledge that these happen outside the museum (with or without mc)?	7	6	0.77
Q22	think about social interactions outside of the Museum walls (with our without mc)?	5	5	1.00
Q24	pause to watch others use an exhibit?	2	13	0.01
Q25	interact with people outside of their social group?	0	15	< .001
Q26	Rating: self-report being aware of their own thinking at some time while in/using exhibit?	3.46	3.28	0.39
Q27	Rating: felt like they learned about self or others (Intercept Interviews: Scale)?	3.42	2.6	0.002

Exit & Intercept Interview Findings – Metacognition Description

Because intercept interview participants used only Card Sorts and Arena exhibits, and exit interview respondents could have used any of the SoS exhibits, findings are presented for each data set separately.

Respondents metacognated while using SoS exhibits

Evidenced CP1 and/or CP2 during exhibit use:

- 92% of exit interview participants
- 98% of intercept interview participants

Out of 100 Exit Interview participants, 78 self-reported that at some point while in the SoS exhibition they had been aware of their own thinking. Analysis of each interview found that at some point during their conversation with the interviewer, 92 respondents described self-awareness in the form of CP1 and/or CP2 at the time of using the exhibit(s).

When asked outright about what type of thinking they had been aware of during exhibit use, most comments refer to the respondent’s own thoughts and behaviors. Much less frequent are musings about others’ thought processes or roles in sharing, collaborating, or competing. The content of those thoughts echo ideas which respondents shared during the other parts of the interview.

We did not ask intercept interview participants if they had been aware of their own thinking. Analysis of intercept interviews found evidence of CP1 and/or CP2 during exhibit use for 98% of participants.

- *I think as a child we approach concepts with a very open mind and as we get older we close up. These exhibits force us to step back and use different parts of our brain.[Exit]*

SoS exhibit users metacognated about cognitive processes in the exhibit context

Metacognated about cognitive process during exhibit use:

- 88% of exit interview participants
- 75% of intercept interview participants

SoS visitors thought extensively about cognitive processes in themselves and the in people in their social groups, and less commonly about the cognition of strangers. Among Card Sort users, considering one’s own way of thinking or reasoning often took the form of comparing and contrasting ones’ self with others. Public/Private, Making Meaning, and Common Knowledge generated a lot of this kind of reflection, and respondents were very engaged by their discoveries. In addition to noting differences in each other’s mindsets, respondents and their partners also thought about and/or discussed reasons for the differences. They attributed the differences to age, professional background, personal situations, and political affiliation. Public/Private users were the only people to reference political affiliation during the interview.

SoS visitors, particularly Card Sort and Common Knowledge users were cognizant of mentally struggling to make choices in the game. Some Sort and Switch, Trading Places, and Who Do You Think I Am? users were aware of what society would expect them to select, or aware that they were automatically making selections that comport with stereotypes, even though they didn’t believe that they felt that way. Common Knowledge users spent time considering how they and others would make choices, and discussing with each other how they think that most people think.

Arena users’ attention to cognitive processes tended to focus on the game play, figuring out how to play, and wondering what others would do. TextFish users were aware of figuring out how to play the game, and considering the implications of overfishing in the game and in the world outside the museum.

Naturally, Freeloader players thought about possible strategies that others’ playing the game with them would use. Anticipating the choices of other players felt easier for some when they were familiar with the other players. Others respondents stated that familiarity didn’t make a difference in predicting others’ moves. Other exhibits at which visitors tried to anticipate what players would do included Career Criminal and Trust Fountain. Visitors at those exhibits observed other people and tried to predict the outcomes by watching their faces and musing about possible dynamics between the players, e.g., parents and children at Trust Fountain.

Team Snake players were very aware of the mental processes needed to compete in that fast-paced game, i.e., concentrating and trying to communicate. Red/Blue players were the least likely to comment on cognitive processes.

Visitors reflected on their own manner of thinking in comparison with others’

Respondents who played Public/Private, Making Meaning and Common Knowledge described actively examining their own thought processes and those of their partners. People often made note of how they were similar or different from their partner, and appreciated getting insight into how others think. They were very interested to see how others sorted the cards, and eager to learn about why they made the choices they did. Different mindsets or perceptions of issues represented by the way people sorted cards were explained by age differences; lifestyles, such as living in urban or rural settings; or personal situations, “he goes to private school.” Public/Private users were the only respondents to reference political affiliation, “she was more republican toward things.”

More than one parent in the sample noted that their child thought differently than they did despite being raised by them. One young person stated, “I learned that different people have different feelings and different feelings about what it means.” One Sort and Switch player felt grateful for a diversity of gender- and culturally-based perspectives, “it would be pretty boring if we were all the same.”



People also learned about individual proclivities regarding empathy, “I could empathize more with humans and animals than I can with nature, and that my Mom sympathizes with mothers and husbands;” and approach, “I went by instinct and didn’t think it all the way through, but then I had to think things through more. It’s a great way to think about your brain.”

- *The texting one . . . dilemma . . . but my friend didn't really think of it like that. Maybe it was our age difference? I thought he (the guy in the texting picture) looked stressed because he was worried about texting, but she didn't see it that way. (Youth referring to adult caregiver) [Exit] [Making Meaning]*

Visitors reflected on their own cognitive processes

Most exit survey respondents who mused about themselves did so in conjunction with thinking about the others in their party, e.g., “I’m slower at making decisions than he is,” but a few learned or confirmed things about themselves without that type of comparison. These reflections included observing one’s own abilities or propensities, e.g., to concentrate well or to observe rather than participate.

- *An hour or so ago I walked by this and there was a Bart card with a lot on it, and when I came back it was gone which was weird ["in what way"] I learned that I'm more of an observer . . . like I didn't act by putting anything in or taking it out, I just observed others work. [Exit] [Donation with Contemplation]*

Visitors were self-aware of ruminating over choices in the games

People were very aware of ruminating over choices that they had to make, particularly at the Card Sorts. Two people consciously considered what they thought was expected of them, “I was very aware of myself and what it was expected of me to do.” Public/Private and Common Knowledge made people think about their assumptions or opinions, and how others consider the same issues, “we talked about what most people would do...” Many Sort and Switch and Trading Places players were frustrated by the choices they made which didn’t comport with what they believed about themselves, “I just automatically put male... it’s really hard to stop and do it the way the game says.” One Freeloader player commented on having to “make a choice about whether to keep the game going...”

- *You just become aware of your behavior. Like, "Oh, is this what it expects me to do?" Or you wonder what others are thinking or wonder if you can sort of beat the system -- you watch and learn like you expected it , or say, "oh yeah, that's interesting." [Exit]*
- *I really had to think . . . like water, that should be public, but we have to pay for it, so it's private and I really had to stop and think about my reaction and how we pay for it, but we shouldn't really pay for it. [Exit] [Public/Private]*

Arena users considered their own and others’ cognitive processes in the games

Arena respondents were attentive to their own and others’ cognitive processes primarily within the context of gameplay. TextFish players had been aware of figuring out how to participate in the game as well as considering the implications of fishing in the game and in the world. Freeloader players emphasized their attention to the thought processes and strategies of other people. Team Snake players thought about the mental processes necessary to compete physically, e.g., needing to concentrate and watch others, and needing to communicate. Red/Blue players were the least focused on cognitive processes.

- *I found myself getting caught up in their (the kids) anxiety about getting enough fish and there was someone else texting who I couldn't see anywhere which raised the anxiety level. [TextFish]*
- *I liked it because it was cooperative. You know, group played rather than solitary. ... Just the challenge of wondering what others might do and what your decision should be . . . just kind of a challenge. [Freeloader]*



Visitors anticipated others' cognitive processes in the games

Freeloader, Trust Fountain and Career Criminal users described actively wondering about or trying to figure out what other people were thinking. "I kept trying to read her face and try to figure out whether she would squirt me."

- *A lot of self-reflection going on which was another reason I liked it. I also found myself thinking, "What was the other person thinking?" I had to make sure she would be cooperative. I had a feeling she would be. A lot had to do with feeling, like having a hunch. I can imagine myself thinking about this later on tonight, too. [Exit] [Career Criminal]*

SoS exhibit users metacognated about collaboration, competition, and sharing in the exhibit context

Metacognated about their own and/or others' thoughts and behaviors regarding collaboration, competition, and/or sharing in the exhibit context:

- 74% of exit interview participants
- 61% of intercept interview participants

Interview participants consciously thought about competition and collaboration in myriad ways while using SoS exhibits. Most respondents who reported doing so had been using Arena exhibits. Many people considered how they operated within the game(s) and reflected on what type of competitor or collaborator they are. Several respondents thought more broadly about human nature and competition, such as, how competitive behaviors can be different under different conditions. For example, getting more excited to compete when more people are present at Red/Blue. Sort and Switch players mused about the competitive or cooperative nature of men and women.

Arena players contemplated teamwork and the difficulties of having to coordinate with others. Team Snake players especially thought about needing to communicate in order to work in concert, something that can be hard to do in stressful conditions. Team Snake players also mused about leadership, i.e., good leadership is necessary to play the game well. Reflecting on this, one parent noted that it's easier to be a leader at work than with his family.

Respondents also thought about other people in competitive or cooperative situations. Other people's perspectives are an important part of the equation. They need to be understood and can influence others' choices or behaviors. Familiarity among participants, or a lack thereof, can also affect the dynamic. Trust plays an important part in this as well, a point which Trust Fountain and Career Criminal players considered as they anticipated a possible squirt or jail sentence.

Red/Blue players had clear memories about their motivations while playing with the exhibit: color preference, deciding to support the underdog, even getting "caught up in the urgency to win," all of these were influences. Some people chose to play the way they did to affect the experience of others, e.g., changing sides at Red/Blue to see how others reacted, or holding down the button at Freeloader to extend play for the family group.

Metacognition about sharing in the exhibit context was less prevalent than collaboration/competition, and limited to people who had used or watched TextFish, Trading Places, Be Kind, Rewind, Give and Take Table, or Donation with Contemplation. They felt good about rewinding the video for others (at the prompt given by the exhibit), or happy to see people make a donation. One had to pause to consider why she chose not to leave something in the bowl at the Give and Take Table. Overall, most musings about sharing resources had to do with scaling up to life outside of the exhibition, primarily at TextFish. Please see below for more detail.

Arena users thought about their own and others' manner of competing or collaborating

Many respondents contemplated their own and/or others' performance in the Arena game itself, usually assessing approach to collaborating or competing, "my automatic instinct was not necessarily to

cooperate...” Some of them drew conclusions about themselves, “maybe I’m more competitive,” or about competing in general, “everyone likes to win.”

- *[I learned] that we're all a lot more competitive in our family than I realized. ... Just that all the kids were really rooting for the team they were on. [Exit] [Red/Blue]*
- *I get anxious because I am competitive but I still want everyone to have a good time. I felt conflicted . . . there are good things to both sides, and I have to decide which is more important. [Freeloader]*

Visitors considered human nature regarding competition and collaboration

SoS exhibits gave participants an opportunity to consider the nature of competition, including the idea that conditions can influence competitive behavior. One respondent was clear that in Freeloader he was playing for points, but in real life he would try to distribute things more evenly. A Red/Blue player felt that having more people present made him feel more competitive. Another respondent described the SoS exhibits as experiments, and registered surprise at people’s reactions, specifically noting that at Red/Blue, “people turn into competitors and it turns into a visceral reaction.” Several people mused about the competitive or cooperative natures of men and women in response to playing Sort and Switch.

- *Volunteer's Dilemma - I think that people probably act differently in this game than they would in real life. I learned that at least in my group of friends that everybody was really good natured... But, I [had] thought because it's a game they might be more self-serving. [Exit]*
- *I was previously here with my girlfriend and was thinking in terms of that relationship and as well as with bigger teams since I'm here with more people tonight. [How is it different?] Levels of competition and relationships change how I play, like red/blue is a larger level [of competition] with more people than with two. [Why do you think that is?] Just, more people fighting to win. [Exit] [Red/Blue]*

Arena users considered teamwork and communication

Team Snake players often thought about coordinating with other players in the games, and teamwork in general. Team Snake requires people to work in concert which can be difficult, “lots of strategizing [you have] to really think about communication.” The fast pace of Team Snake adds to the challenge of communicating “what your brain is thinking ... it’s hard to articulate that when you’re under stress.” Though the need to communicate and rely on others made teamwork difficult, several people specifically enjoyed it, “Teamwork made it harder for me, but it’s really fun to compete with friends.” TextFish and Freeloader players who commented on teamwork touched on making group decisions and sacrificing for the sake of the group effort respectively.

- *That you have to cooperate with other people in order to do a lot of things here - like, it pushes you beyond your normal way of operating and thinking about things. ... I just usually do stuff myself and don't rely on other people to do things, so it forces you to think beyond what you normally do. [Exit]*

Team Snake players considered leadership

Team Snake players mused about leadership while they were using the exhibit. One person’s group found that trying to cooperate was difficult without having a leader. Another person reflected on the fact that for him it’s easier to be a leader at work than at home because of the family dynamic.

- *You have to have a leader to do well and it makes it easier. ... We tried to cooperate and it was hard! The group we watched and this group (nods towards the teenagers using the exhibit) have a clear leader, so they are doing better (gestures to indicate that one of the users is directing the others to push buttons at certain times). [Team Snake]*

Visitors considered the viewpoints of others in competitive or collaborative situations

Several people pondered the viewpoints of others in the context of competition or collaboration, “I realized that sometimes you have to take a step back and see how other people feel. . . .” Other people’s perspectives can be influential, as one respondent found when strangers recruited her to play on the red side of Red/Blue.

- *I realized that sometimes you have to take a step back and see how other people feel . . . that you can't just rely on yourself. . . . I think sometimes you have to anticipate how other people think and be open to hearing their ideas and be willing to change. [Exit]*

Visitors considered familiarity with others in a competitive or collaborative situation

A few people thought about the idea that competition can be influenced by familiarity of the participants. One Freeloader player said that since he played with his family they all knew what to expect. Another felt that, “even if you know ‘em, it’s hard to figure out what they are gonna choose.” One young respondent concluded people one knows and trusts will be “nicer” than strangers.

- *[I learned] that people you trust are more likely to be nicer. For example, Trust Fountain - if they're not some random person, but someone you know, you're more likely to get a drink of water rather than a squirt in the face. [Exit] [Trust Fountain]*

Visitors considered trust in competitors and collaborators

Many people made lighthearted observations about the people they were with, often considering their own thoughts and behaviors in the process. Playing Red/Blue made one parent realize how competitive his family is. Trust Fountain and Career Criminal were often where people learned or confirmed that their partners were on their side or not, frequently referencing trust or predictability. “I learned that I know a lot about her and she knew me well enough to not want to do the squirt with me.” More than one respondent was at the Museum on a date and commented that these exhibits were a great way to learn about each other.

- *I learned a lot about this one [his date]. I learned how cooperative she is - she's got my back - we have each other's back. [Exit] [Career Criminal, Freeloader]*

Visitors considered their motivations to compete or collaborate

Many visitors remembered considering their motivations, choices and behaviors while playing with the SoS exhibits. Red/Blue players described how they thought about their allegiance and who they wanted to support, “I was aware I was drawn to the underdog.” Another just got caught up in “the urgency to win.” One person remembered choosing to play Red/Blue and Freeloader in such a way that play was extended so that he wouldn’t feel bad if the people in his party lost the game. One of them even switched sides to see how his children would react.

- *I realized what was happening and wanted to see what would happen if I switched sides . . . to see how upset or competitive [my children] would get. I would just switch sides to see how the kids would behave . . . pretty straight forward . . . my son got particularly competitive and recruited people to his team and my youngest switched sides to help people out. [Exit] [Red/Blue]*

Visitors thought about helping others and sharing in the exhibit context

Most thinking about sharing resources took place at TextFish and Public/Private. A few people were also moved to think about sharing by using or looking at Be Kind, Rewind, Give and Take Table, and Donation with Contemplation. Two respondents reported having good feelings about helping or sharing: one upon rewinding the video for others with a little help from the prompt on the video; the other upon seeing someone make a donation at DS, “I was happy that people donated to zoos ... I work at a zoo and that it matters to the public- I saw someone donate!” When her partner put something in the Give and Take Table bowl, one visitor was made to think about why she did not want to put anything in it herself.

- *I thought about why I didn't want to put anything in. He stuck something in right away so I thought, "my hair bands are too important." [Exit] [Give and Take Table]*

SoS exhibit users metacognated about gender bias and stereotyping, including scaling up

Metacognated about bias and/or stereotyping (by self and/or others) including scaling up:

- 26% of exit interview participants
- 17% of intercept interview participants

This section presents metacognition about stereotypes and biases without separating responses which scale up, because while reflecting on issues of bias and stereotyping, respondents very often wove together reactions to the games themselves with real-world references. For instance, gender-based stereotypes suggested by Card Sorts were automatically related to real-life examples, especially when the speaker had been frustrated by the sorting exercise.

SoS visitors who used Sort and Switch, Trading Places, or Who Do You Think I Am? were faced with their own biases, often reacting with surprise or frustration. These activities gave people an opportunity to experiment with or challenge stereotypes. Many users thought about the power of socially ingrained biases, which made sorting the cards difficult to do. While using Who Do You Think I Am?, respondents felt acutely aware of what society would expect them to choose. Trading Places caused some people to become aware or more aware that gender stereotypes exist.

In response to Trading Places, Sort and Switch and Who Do You Think I Am?, visitors frequently scaled up to personal experiences with stereotyping. They reflected on their own and others' lifestyles, usually noting how they are different from the stereotypes suggested by the games. Recognizing their bias in the game was cognitively dissonant for several people, including two professional women who felt very frustrated because their choices aligned with stereotypes which are counter to how they perceive themselves to live their lives. Who Do You Think I Am? caused people to think about the pervasiveness of, and serious problems caused by prejudice in our society.

Trading Places, Sort and Switch and Who Do You Think I Am? users also scaled up to stereotyping at a societal level, noting that stereotyping affects all aspects of life and is responsible for prejudice, income inequality, etc. Difficulty sorting cards in Trading Places and Sort and Switch forced visitors to ponder how deeply ingrained gender biases are, and how well society is - or isn't - moving past them.

Card Sort users face their own gender biases

Many SoS visitors were moved to consider their own gender bias and how it was formed. One woman considered how her gender bias has changed, "What I've learned thinking back to perceptions of what I thought in my childhood is pretty different than what I think now. My thoughts have evolved." Quite a few respondents were surprised or frustrated to have difficulty sorting cards at Trading Places and Sort and Switch, because they consider themselves not to have gender bias, "That one, the male and career one, it really made me mad!" Several people commented on how ingrained gender bias is, "as much as I tried to put female in career, I just automatically put male in it. It is just something we are taught to do and it's really hard to stop and do it the way the game says." Two players consciously went along with the standard bias because that made the sorting tasks easier to do.

- *Kind of made me look back at my own answers, especially when they were in card form. It made me question my choices. I went into some of the games and was making quick decisions based on what I thought I believed, but when I went slower I really questioned my beliefs. [Exit] [Sort and Switch, Public/Private]*
- *Definitely! The gender role one - sorting cards in different categories and I was thinking I knew where they go - when you think of that consciously it makes you really aware of your biases - brings it to the fore. [Exit] [Trading Places]*

Who Do You Think I Am? users were self-aware of considering stereotypes

Who Do You Think I Am? users were conscious of common stereotypes as well as their own attempts to match the labels with the portraits. Before figuring out she could change the labels, one woman found she accepted the combined labels and images as they appeared when she approached them. She then realized that she had gotten, "caught up in preconceived notions. I felt like a jerk for thinking what was already showing made sense – for trying to go along with it." Another Who Do You Think I Am? user who played with matching different labels to the different faces concluded that, "... it would be hard to put any specific category to any of those faces."

- *The wall with the portraits. I had to pick a phrase that matches. I was thinking about stereotypes and what society expects. [Exit] [Who Do You Think I Am?]*

Visitors scaled up to personal experiences with stereotyping

Most SoS visitor comments about stereotyping had elements of scaling up woven into them. Gender stereotypes addressed by Trading Places and Sort and Switch got people to think about their own or others' marriages. Recognizing their biases in the game was upsetting for two professional women. They were angry with themselves for the way they sorted the cards, because in real life they do not live those stereotypes. The reality and dangers of first impressions and prejudice came to the minds of several, Who Do You Think I Am? users. Prejudice can affect a person in "every-day interactions... like standing in line at Starbucks..." Another respondent deals "with issues of race, class, gender identity" daily at work in a public school where many students have parents in jail.

- *That one, the male and career one, it really made me mad ... we both want to go to medical school and I got mad at myself since I kept doing what I thought I wouldn't do . . . saying that I want a career, kept putting female with laundry and things like that. [Exit] [Sort and Switch]*

Visitors scaled up to societal issues around stereotyping

Respondents who used Who Do You Think I Am?, Trading Places or Sort and Switch thought a lot about stereotyping noting it is common in society and affects how we live, including "everything from perceived job qualifications to choosing the direction of careers from early childhood." Stereotyping, in the opinion of one respondent is at the root of "why we have prejudice, income inequality, underserved populations..."

Many Card Sort users emphasized that gender bias is deeply ingrained in us which makes it hard to change. "Society still has a long way to go in solving these issues" thought one respondent. Two other people expressed a more positive outlook as they scaled up to life outside of the museum. One man had been thinking about positive changes, e.g., the CEO of Apple is a woman. Another woman who used Trading Places connected it to the wider world with a strong sense that "typical roles for men and women have shifted and are past tense."

- *We're at a good paradigm shift ...getting out of the archaic thing of women at home and men at work. Like the CEO of Apple is a woman. You wouldn't have seen that 30 years ago. ... It made me in a critical moment think about equality among men and women in the work field. ... I was thinking of my past experience of what I've seen through the evolution of pay and things like that where we are getting to a better place with more equality between men and women in the workplace and men being able to be the ones who stay at home and take care of the home. [Trading Places]*

SoS exhibit users scaled up about social interactions

Scaled up about social interactions:

- 25% of exit interview participants
- 10% of intercept interview participants

A quarter of exit interview respondents, and 10% of intercept interview respondents engaged in scaling up about social interactions while using SoS exhibits. Attending Helping and Wealth, compelled visitors to think about behavior outside the Museum walls. People personalized it by finding and considering behavior in places that they knew, or trying to find out where people would treat them well or not. The meanness of New Yorkers featured in several comments. One person tried to account for that by pointing out that because life is difficult and competitive in New York, "you have to survive and only worry about yourself there."

Respondents easily put themselves in the places of people in the videos at Explorations of Social Behavior, expressing surprise and disappointment that the people in the videos weren't more kind to each other, and extended those feelings to real life. At least one person pondered what life could be like, "... if we all just stopped to help, society would be much better."

Explorations of Social Behavior videos compelled viewers to think hard about what they would do in those situations. Considering what they would do prompted people to acknowledge their own way of operating in groups or with authority. It was disturbing for people to think that they might not do the right thing. These videos also gave people a chance to reflect on the behavior of others as they experience them at work, e.g., the emergency preparedness expert who trains people how to manage others in emergency situations.

SoS visitors actively thought about communication-related cognition outside the Museum walls. Inspired by the exhibition overall, two people thought about presenting and sharing information in different modes to support classroom learning. Professionals who use communication in their work thought deeply about it while in SoS, e.g., the need for effective communication techniques in emergency situations, and shaping language to manipulate people. Common Knowledge and Freeloader users mused about the difficulties of sharing ideas with people in daily life because people are individuals, they think differently from each other; we don't have a "hive-mind... like bees where you think as a unit."

A few different exhibits made people consider family dynamics, especially communication and collaboration. Marital and constructive arguments in the videos are easy for visitors to relate to their own lives. Trading Places, Freeloader, and Team Snake gave respondents a chance to reflect on how their families operate, i.e., who is the natural leader.

SoS exhibit users scaled up about helping others and kindness

Exit survey respondents readily thought of life outside of the museum while looking at Helping and Wealth and Explorations of Social Behavior. Several respondents checked the map to find out where around the world people are kind or mean, "we were trying to find people who are least likely to help you on the street." The meanness of New Yorkers featured in several comments. One person allowed as how life is difficult and competitive in New York, "you have to survive and only worry about yourself there."

Video watchers easily put themselves in the place of people on the street who need help. One woman shared a detailed story of helping an elderly stranger who was lost and spoke no English. She concluded with, "That video just made me think of this - that people don't care anymore, but if we all just stopped to help, society would be much better." Using and reading Give and Take Table, Donation with Contemplation, and Be Kind, Rewind proved to one woman that people "aren't that kind" even though they think of themselves as being so.

- *I guess putting myself in that position ... The person that needed help- I would want someone to help me if I were in that situation and I was surprised that people don't help more... because the person is in such obvious need of help. I expected people to be more willing. [Exit] [Explorations of Social Behavior]*
- *Generosity and kindness, friendliness, inclusion, sharing - general overall. Everyone thinks they are quite kind but then you see what they really do like with the Donation Station and Rewind, and they aren't that kind. [Donation with Contemplation, Be Kind, Rewind, Give and Take Table]*

SoS exhibit users scaled up about human behavior and social pressure

Explorations of Social Behavior users were very moved by the social experiment videos; they put themselves in the places of the people they watched, questioning how they would behave. Many commented on the group dynamic among the people in the smoky room and wondered if they would stay or leave, "I'm really self-conscious... not sure I'd get up." Several respondents sounded perturbed by the possibility that they might do something unethical if so instructed by an authority, "if I was in those situations I think I might do what most people would do, or I might just walk away, but I'm worried that I might have given the electric shock in the Stanford experiment, for instance. I don't really question authority." A few Career Criminal users also put themselves in that situation contemplating what they would do if they got in trouble.

A few visitors used the videos to reflect on the behavior of others. A man involved with earthquake preparedness compared the behavior of people in the fire video with how he believes trained people

would behave, also scaling up to possible emergencies in an airplane. A zoo employee and babysitter thought about the role obedience plays in her jobs and reflected on how in all “daily life [obedience] changes social interactions.”

- *The documentary and how it talked about how you might do something unethical if you are told to do so by someone with authority. . . . If someone you think is in command tells you to do something, even if you think it's wrong you may still do it because they have authority. I kept thinking, trying to remember if I have, or if I would do something ethically wrong if told to do so by someone in authority. [Exit] [Explorations of Social Behavior]*
- *Definitely during the crime one, I was very aware of what I was going to choose, because part of me wanted to talk, but then I started to think about what I would really do in that situation. [Exit] [Career Criminal]*

SoS exhibit users scaled up about communication and cognition

SoS visitors actively thought about communication and communicating outside the Museum walls. Inspired by the exhibition overall, two people thought about presenting and sharing information in different modes to support classroom learning. One high school student explained that he tries to “find the middle ground between how other participants are thinking and after presentations I think about whether or not I really made a difference in presenting.”

Professionals who use communication in their work thought deeply about it in SoS. A charge nurse reported that the Explorations of Social Behavior videos got him thinking about directing his staff to communicate effectively with patients in high-stress situations. Looking at the Red/Blue label, a marketing expert was moved to consider how people can be manipulated with language, “People will take a risk if presented in terms of losses instead of gains.”

I was thinking about work, how to use that example in my work - I do marketing - actually I was thinking, “how can you manipulate that example?” People will take a risk if presented in terms of losses instead of gains. The emotional trigger seems to be fear. [Exit] One Common Knowledge player thought to herself, you can’t always be sure that people understand you, they could have a different idea or maybe they, “just don’t think that way.” A Freeloader user also thought about the fact that we can’t be sure that we understand each other well, humans don’t think alike, we don’t have a “hive-mind... like bees where you think as a unit.”

- *It made me think of how, like you'll see in advertisements and stuff or work on a project with someone, you can see their idea in your head, but their idea may not be what you are thinking. ... Each person has their own intentions in life in general. ... I can't form what I learned into words - almost like the hive-mind idea - like bees - where you think as a unit. But with humans, we don't have that so it makes games like this a lot harder to cooperate and all contribute to the game. [Freeloader]*

SoS exhibit users scaled up about family dynamics, communication and collaboration

Exhibits of various types got visitors to think about family dynamics including arguments, collaboration, and leadership. Marital arguments were easy for respondents to relate to on the Explorations of Social Behavior, and in one case by watching others argue at Team Snake. Trading Places reinforced for one woman the marital counseling classes that she and her newlywed husband had recently attended. Playing Freeloader got two respondents to think about family dynamics. In one family group the mother had held the button down, which for her husband, the respondent, “symbolizes her family function, she holds us all together...” Playing Team Snake made one person think about the dynamics within families, among strangers, and at work. He found it “much easier to be a leader in business than it is to tell your family what to do.”

- *I was just comparing some of the things to my life ... there was a couple arguing at the snake game and I was thinking about the fight I had yesterday with my husband . . . grown-up problems (laughs) [Exit] [Team Snake]*

- *The dynamic between family, strangers, business, and leadership . . . it all ties together. . . That there's a very different dynamic with my family and in day-to-day life. It's much easier to be a leader in business than it is to tell your family what to do. . . That's definitely something I thought at the time. [Team Snake]*

SoS exhibit users scaled up about competition and collaboration

Scaled up about competition and collaboration, self and/or others:

- 34% of exit interview participants
- 33% of intercept interview participants

SoS visitors make many connections to collaboration and competition in life outside the Museum. Several Red/Blue players were reminded of professional or college team sports, “The way people approach these games is similar to how they do in real life.” Teamwork and choosing to be a team player easily scale up to life in general, “If everybody was a little more in it for the team, we would all be better off.” One Explorations of Social Behavior watcher reported pondering how people collaborate to make decisions. Career Criminal and Freeloader got one woman thinking about her own way of trusting and interacting with family and coworkers. Several people related SoS activities to game theory; one person applying it to their small-town community.

- *[I] was mainly thinking about the consequences of snitching versus not snitching. Each one can have different consequences. Where I come from, a small community, it can be looked on as for the greater good or hurting the community if you don't snitch [Career Criminal, Freeloader]*
- *... I like to see if there's a difference between communal decision making or individual decision making. So, I'm always looking for ways to add to or adapt to particular situations . . . particularly in my roles as teacher and scholar. [Exit] [Explorations of Social Behavior]*

SoS exhibit users scaled up about sharing resources

Scaled up about one's own thoughts and/or behaviors related to resource sharing:

- 13% of exit interview participants
- 10% of intercept interview participants

Scaled up about other people's thoughts and/or behaviors related to resource sharing:

- 22% of exit interview participants
- 18% of intercept interview participants

Thought about or acknowledged wide-scale issues of resource sharing without associating them with personal or local behaviors:

- 19% of exit interview participants
- 13% of intercept interview participants

Visitors naturally scaled up and out of the museum while playing Public/Private which asks users to consider things outside of the museum, like clean water and health care. Respondents reported actively pondering the way our society is structured around utilities, why some things are free and others are not. They also considered socioeconomic roots of uneven access to resources. Apart from Public/Private, visitors considered the “tragedy of the commons” and how we make “heart decisions” even when hard data are available. Along similar lines, a Helping and Wealth reader thought about ineffective resource sharing based on emotional responses to the needs of disabled people.

The entire SoS exhibition is “about cooperation at a higher level,” for one respondent who related it to “the whole culture and idea of sharing... like couch surfing.” Another visitor related the exhibition as a whole to “competition for resources and scarcity of resources.” He had been thinking about the fact that he actually moved away from the Bay Area many years ago specifically because of “watching people compete for resources.”

Public/Private users scaled up to sharing resources on a societal level

Not surprisingly, Public/Private respondents easily scaled up to a societal level of resource sharing. People remarked about needing to pause and think about “how we live,” and wonder “why we get some things for free vs. paying for others.” Some Public/Private users considered uneven access to utilities noting that the game presents “a lot of resource scarcity and how society creates conflicts,” and that “people should have access to things but it depends on their socio-economic status.” A few people noted that Public/Private helped them understand others’ perspectives on these issues, including political affiliation. One person pointed out that though we’ll have a new administration, which might have different views than the current one, the way he sorted the cards would not change. Another Public/Private user observed that Europe has more public services than we have in the U.S. Public/Private was the only exhibit to elicit references to political affiliation.

- *Public versus Private because of the discussion that we got into. ... Based on those cards I think that certain things shouldn't cost money. ... It's hard to because I know that they cost money because people that work for them need to get paid, but I think public transportation should be free, medical, etc. [Exit] [Public/Private]*
- *The sharing one (public vs. private) - in our modern society what things are free and what things are not and how maybe in the future - how it would better our society if some things were free and others were private...I started thinking of capitalism, socialism, communism, different types of government . . . marketing, free market. . . . [Exit] [Public/Private]*

Visitors scaled up to societal issues related to sharing resources (apart from Public/Private and TextFish)

Musings about how society shares resources were primarily caused by Public/Private and TextFish, but a few other exhibits were also mentioned. Considering the Tragedy of the Commons, one respondent thought about people making emotionally-based decisions with implications for policy; people tend to make “heart decisions even when we have a lot of data. We seem to choose the heart over the mind.” Another person had similar thoughts while talking about what she perceives as insufficient distribution of resources to support injured people due to emotional biases, “I think it comes from over-pitying people with disabilities, we overcompensate to help them and under compensate to help others who need help.” One respondent was focused on individual efforts, noting that “it’s up to each individual to make the changes they want to do” because society isn’t responsible or helpful in these issues.

- *OK - as odd as it may sound, this hit me really heavily - the Tragedy of the Commons. One of the topics / subtopics I'm writing about is how the decisions we make, political, not individual, affect our environment and not necessarily the individual choices that we would make and I would think that it's interesting, particularly from my perspective. Let's say it this way - we make a lot of heart decisions even when we have a lot of data. We seem to choose the heart over the mind, so Tragedy of the Commons brought that into perspective. [Exit]*
- *...on the helping graphic, the problem in society with people perceiving people with severe outward disabilities and the need to pity them . . . the blind people got more help in a lot of the cities whereas injured people didn't receive enough help. The balance is off with impaired judgment with the public deciding who needs help and who doesn't - injured people may be able-bodied normally, but need help when they are injured. I think it comes from over-pitying people with disabilities. We overcompensate to help them and under compensate to help others who need help. [Exit] [Helping and Wealth]*

SoS exhibit users associated personal and local behaviors with large-scale issues of resource sharing

Metacognate about wide-scale impacts based on local behaviors or issues related to resource sharing:

- 10% of exit interview participants
- 9% of intercept interview participants (including 8 of 13 TextFish players)

TextFish players readily associated their own behaviors to global-scale issues of overfishing. One person who had seen the TextFish exhibit on several different visits to the Museum has changed her eating behaviors, suggesting that the change in diet might be related to her experiences with the exhibit. TextFish users also consider overfishing from a less personal level, referring to our growing human population. TextFish moved players to contemplate greed and why people behave in a greedy way. Selfish behavior can result from a scarcity mentality such as buying and hoarding supplies when a large storm is imminent, or the excitement of competition they experienced while playing the game.

Visitors would like to see TextFish itself outside of the museum walls so more people can learn from it. In the words of one respondent; TextFish “models perfectly how we over fish.” He felt like “we could change that because things like this [exhibit] will teach them a lesson.” One man who used TextFish felt that it was an excellent way to “teach people to share,” adding that the use of cell phone technology makes it accessible. He thought TextFish should be “taught in every single school that exists.”

TextFish users connect personal and local behaviors to large-scale impacts of overfishing

Eight out of 13 TextFish players contemplated resource sharing. They were verbose and articulate about their thinking during play. Respondents readily associated their own eating and shopping habits, even the contents of their refrigerator at home, to global-scale issues of overfishing. One person did so by noting that she is vegan while discussing the dangers of overfishing. Others did some soul-searching... “So we eat Sushi and such - my wife is Japanese ... so they have a fish market where they consume huge amounts of fish. Every day. So where do we stop? What’s the appropriate consumption level?” One person who has seen the TextFish exhibit on several different visits to the Museum has changed her eating behaviors, possibly because of it, “honestly I now consume less sushi than I did before I saw this game. I don't know if it's causal or correlated, but I noticed that.”

- *...the choices that I made affected the ecosystem. I don't really have to fish for my food, but, playing the game relates to thinking about the food I get at the grocery store and how much I eat and how much rats in my fridge. ... my actions affect more than just myself and you always need to balance. ... So, instead of just making sure that I'm fed, realizing that it affects the ecosystem - so that if I overfish, there's no more fish, but I still have to make sure I'm well fed as well. [TextFish]*

Several TextFish users consider overfishing in terms of a growing human population, rather than at the level of what they personally consume. “It made me think of supply and demand... extinction can happen anywhere as [human] population grows.”

A few respondents thought about greed. They pointed out that people can be greedy even if that isn't their intent, because a scarcity mentality and/or the excitement of competition can fuel greedy behavior, e.g., buying and hoarding supplies when a large storm is imminent.

- *I feel it made me more aware of how the mentality of competition can overpower our awareness of resources. ... even though our intention may not be to be greedy or hoard all the resources, the mentality of competition can probably get that (greediness and hoarding) as a by-product. [TextFish]*
- *Because a lot of people have been overfishing and stuff like that. You can see that when it was happening everyone loses, but if people aren't greedy and fish everything, then everyone gets some. ... It was fun because it made me think about how we over fish sometimes. [father spoke: Did you like the interactiveness?] Yes, I liked how I can use my phone and see when I need to fish again. [father spoke: Last time we were here she kept trying to reread it out.] I only made the fish go extinct once. I don't want to do that again. [TextFish]*

TextFish users valued the exhibit and wanted to share it widely

- *It models perfectly how we over fish. ... It affects the other people so much and I really commend the Exploratorium for having the exhibit. It's not fair that people are over fishing so much and they (fish) are just innocent creatures that we are eating them for enjoyment and it's impacting them unfairly- they're the future. ... I learned sometimes people don't listen. They fish, fish, fish, but they don't care about the environment. They just care about themselves. ... We could change that because things like*

this [exhibit] will teach them a lesson because they can use it to see how harmful their actions are to the ocean and fish. [TextFish]

- *How the fishing example needs to be taught in every single school that exists. It's a really good example of how to teach people to share and since everyone uses their cellphones now it gives them something to do with them. I'm going to look online to see if it (the text fish game) is available there. ... Because they're useful and different than anything I've seen at other children's museums and the Bay Area Discovery Museum and they are making kids ask questions about social development and giving them realistic answers instead of what the internet has out there. Like the Fishing one mostly teaches what happens when you only think about yourself and I don't think they learn that in school. [Exit]*

SoS exhibit users associated SoS with scientific research and game theory

Associated SoS exhibits with scientific research and/or game theory:

- 14% of exit interview participants
- 6% of intercept interview participants

We did not ask respondents about scientific roots of the SoS exhibits. Nevertheless, a total of 20 people (10% of combined interview samples) referenced this during their interviews. Most of them had studied psychology in the past. One currently conducts related research in the lab. A few people were also familiar with game theory. One TextFish player ended up thinking of that exhibit as an experiment, not just an activity. Another research-minded visitor would have liked to have seen a Bell Curve of players' times at Sort and Switch to "see what the average tie is and break that down over a number of metrics."

- *This IS my life outside the museum, it's what I do day in and day out... I'm a social psychology PhD. . . . I've done research about a lot of these, and that's why I found them engaging. . . . How what I do at work is being applied outside of my lab. . . . Social identification research is what I do specifically and this is all about that. [Exit]*
- *I thought it was a neat exploration of ingrained gender association stuff. . . . I like that it's an easy demonstration of something that most people don't usually think about and I imagine it's pretty effective since it operates on an unconscious level and if you haven't practiced with it much it would be hard to change the outcome. . . . I'd also be interested to see a Bell Curve of the times people take on either side. I'd be interested to see what the average time is and break that down over a number of metrics. [Sort and Switch]*

Respondents watched other visitors

Watched other visitors using SoS exhibits:

- 68% of exit interview participants
- 15% of intercept interview participants

Out of 100 Exit Interview participants, 68 reported that they paused to watch other people use exhibits in the SoS exhibition. Thirteen out of 50 Arena users and only two out of 50 Card Sort users reported observing people at the exhibits at which they were intercepted (15%). For each exhibit observer, we coded up to three reasons given for pausing to watch others.

Reason to pause and watch others		Exit (n=68)	Arena (n=13)	Card Sort (n=2)
W7	I wanted to see others' strategies, reactions, experiences	60%	46%	2
W6	I wanted to figure out how to use it or do it	28%	15%	
W4	They seemed engaged (laughing, making noise, talking, etc.)	26%	38%	1
W5	It looked interesting, I was curious about the game	22%	23%	
W3	The noise attracted my attention	16%	8%	
W1	My social group, we were doing things together	12%	31%	1
W2	Waiting for a turn	7%	15%	

Reason to pause and watch others		Exit (n=68)	Arena (n=13)	Card Sort (n=2)
W8	I wanted to compare my performance with others'	6%	38%	1
W9	Reference to white lines/labels on the floor	0%	0%	
W10	Other	19%	31%	

Overall, the most common reason given for pausing to watch others at exhibits in SoS was to see other peoples' strategies, reactions, and/or experiences. Over one third of Arena users also paused because other people seemed to be engaged, because they wanted to compare their performance to others, and because they were doing things together with their social group. Most Arena observers were also users at Red/Blue and TextFish.

SoS visitors were easily attracted to Red/Blue because of the often loud and raucous behavior there. Many people were fascinated to observe the players. Noticing the intense engagement of the players moved observers to think about how compelling Red/Blue seemed to be. They often marveled at the "crazy" level of competition, especially given that winning seemed to be such a small reward.

Observers studied the behaviors and reactions of people at Trust Fountain, wondering if they would squirt each other, and thinking about the relationships of the players that might influence their choices. Watching for exhibit users' reactions also helped people decide if the exhibit looked fun and worth the time. Many people reported that they watched others to figure out how to play, identify effective strategies, or compare their performance with that of others.

A small number of people voiced detailed interest in the cognitive processes of the people they were watching. They wondered what exhibit users were getting out of the experience, e.g., were they learning about themselves? One person was gratified to see other people pausing to consider their biases.

Visitors observed competitive behavior at Red/Blue

Enthusiastic play, energetic pounding, and excitement about competing at Red/Blue got the attention of many SoS visitors. They were entertained and sometimes mystified by the behavior they saw at this Arena exhibit. More than one person described the button pounding and the competitive activity as "crazy" or "ridiculous." One player who got swept up in it explained, "It seemed really important to win, but it's just a game with buttons and doesn't really matter." One observant visitor overheard other visitors complaining about the noise at Red/Blue, made her own observations, and then thought about how the kids playing Red/Blue were "getting some sort of pleasure from it, while at the expense of aggravating other people." The body language of intense competition was the focus for one dedicated people watcher, "they were totally leaning in and staring at the screen and using strategies..."

- *It should only be like 2 minutes, but use at 11 minutes now . . . that's crazy, do people really stay there that long? . . . That's ridiculous, it's crazy to see how attracted to things people can get. [Exit] [Red/Blue]*

Visitors observed others' interactions and reactions (apart from Red/Blue)

SoS visitors described watching the reactions and interactions of other people at several other exhibits apart from Red/Blue. Several Trust Fountain observers wondered if the person they were watching would get squirted in the face; one pondered the relationship between the parent and the child, which she expected would predict the outcome. Figuring out the game and/or if it would be fun or worth the time was on the minds of a few exhibit observers. Careful observation on the part of one Career Criminal watcher was rooted in a deep interest in solving crimes. Also watching closely were parents, eager to see how their children would interact with each other or react to the competition in the games.

- *There was this guy watching us. He was fascinated by how we were doing it differently. The guy was watching him [bf] because he finished way before me. [Exit] [Card Sort]*



- *Well, the kids had stopped to watch them so I started watching and wondering what they would do ... if they would treat (the game) like a video game or try to cooperate while fishing. I should say I'm a social scientist who studies cooperation, so I'm interested. [TextFish]*

Visitors watched others to figure out how to play or use the exhibit

Figuring out how to play the game and effective strategies to use exhibits were on the minds of quite a few respondents. This involved critically observing what worked for others and considering “if I would do the same things, react the same ways.” Two people were focused on trying to figure out the game without reading instructions. Conversely one person carefully described reading the instructions as a part of figuring out “the scope or goal and trying to categorize it,” and hoped to “experience something and learn something about cooperation and competition.”

- *I was trying to figure out what the activity was just by watching what they were doing, not by reading the instructions. So, I was actively trying to figure it out from watching their actions. [Exit]*

Visitors watched others to compare their performance and/or experience with their own

A few exhibit observers were comparing their own performance or experience of the exhibits to others. One man thought about how his experience differs from people present on dates or with young children, “I can choose how I want to experience them (exhibits) because my kids are bigger . . .”

- *It was interesting that they got the same thing. I wanted to see if me and my friend got the same. [Exit] [Common Knowledge]*

Visitors watched others in SoS because they appeared to be having fun

Many visitors paused to watch other people because they seemed to be having fun. A few people commented that they were intrigued by the teamwork, the fun competition, people smiling, etc. “They looked like they were having fun... interacting a lot... not just standing there and reading... actually doing something.” Several people specified that it was the button pounding at Red/Blue that caught their attention, “they were having a lot of fun and pushing buttons – I really like to push buttons...” Watching visitors at Team Snake reminded one respondent of a Pokémon game.

- *When people have fun it's fun to watch them having fun - when they smile and they look excited... I was hoping the little boy on my team, the Red team, was going to win. I don't know, it's like team work. [Red/Blue]*

Visitors considered what others are getting out of the SoS experience

A few respondents had a high-level perspective which closely aligned with the interests of SoS developers. Beyond considering the behavior or motivations of other SoS exhibit users, these people were critically observing them to assess, or at least wonder about, what they were learning about themselves or others.

- *Wanting to see a visible reaction to learning something new ... I wanted to see their reaction, figure out if they found out something about themselves, or the one they're with. [Exit]*
- *I'm glad they understand what's going on here and with matching faces with titles. I'm glad people are stopping to think. [Exit] [Who Do You Think I Am?]*

Visitors did not observe others because that is rude

Two people volunteered that they don't want to watch other people because they are aware that this makes others nervous.

- *...trying not to look at them, I didn't want it to look like I was trying to invade their space ... I didn't watch, but I listened to them.. like the card games . . . seeing, or hearing what people discussed there [Exit]*



TextFish observers considered the implications of overfishing

Four TextFish users described observing other players. All of them contemplated the dynamics of the game, two of them scaled up to overfishing in the real world. Please see, *Visitors associated personal and local behaviors with large-scale issues of resource sharing*, above for more information.

Respondents interacted with strangers

Interacted with people outside of their social group at SoS exhibits:

- 26% of exit interview participants
- 15% of intercept interview participants

About one quarter of Exit Interview participants reported that they interacted with a stranger in the SoS exhibition (26% of 100). No Card Sort users did so, but 15 out of 50 Arena users did.

Red/Blue and Team Snake seemed to engender the most contact between strangers. Both exhibits got people to recruit strangers to join the team and to cheer for each other. Red/Blue players weren't very chatty. They acknowledged each other and laughed about the game and/or joined the play or took turns, but didn't converse much. Team Snake users verbally communicated with each other to coordinate game play.

TextFish players made contact with strangers to learn about the game and identify other players, "were you the ones...?" One TextFish player felt like he had been interacting with someone even though the other player was unknown and not visible. Strangers also played together sometimes at Freeloader and Career Criminal, which made the game more interesting.

Red/Blue

Most exit and intercept survey respondents who interacted with strangers did so at Red/Blue. Most interaction was not conversational, but involved playing with/against each other, cheering people on, or just being amused by watching other people play. A few people reported interacting to collaborate in some way. Some respondents spoke to, or were spoken to by strangers, usually to recruit help with the game or "convert" people from one color to another. One person asked others why they chose a specific color.

Two Red/Blue respondents described interactions to support others' experience of the game, including one person who got help from a little boy when her hand got tired. To make it more fun for two boys not in their party, one adult couple consciously kept their scoring even so the boys had to compete with each other for one of them to win. Another person got help from a stranger when her button was "frozen."

- *At Red and Blue, cheering people on of both colors 'cause frankly I'm not that interested in whether red or blue wins - just how people do. [Exit] [Red/Blue]*
- *They were just asking about the game and about the numbers. They wanted to know what color we were and cheered for us [How did that make you feel?] I liked it [Red/Blue]*

Team Snake

People at Team Snake interacted with strangers to recruit players, coordinate play, and cheer for others. One adult who tried to help players get organized noted that it was challenging because "you don't feel like you can tell them what to do. It's not my kid."

- *We figured out what each person was responsible for and learned to communicate and figure out what each person did best, and we got 300 points by doing that. [Exit] [Team Snake]*
- *Just that when they didn't do it right, I exclaimed, "Oh, no!" and then when they catch the apple I got so excited (for them) and said, "Go get the next one!"*



TextFish

One TextFish player felt like she had been interacting with another fisher, but “only virtually” since the other person was unknown and out of view. A couple was approached by a stranger after a round of TextFish and asked if they had been the ones catching fish. The other person to interact at TextFish reported that they explained the game to other people.

- *They learned a lot from us because I told them to only get what they absolutely need. You don't need to over fish. [TextFish]*

Freeloader

Playing Freeloader with a stranger from another fieldtrip made the game more interesting for one respondent, because she didn't know how he would choose to play. Other people interacted regarding how to play the game, one with a staff member.

- *There was a boy from another field trip who played the game with us. It was interesting, but kind of nice to work with someone you don't know where you don't know what they will think - and whether they will choose to support their own sport or give the group chances to continue in the game. [Freeloader]*

Other Exhibits

Other encounters with strangers that Exit Interview participants described included actually playing Career Criminal and Freeloader with people outside of their social group. One respondent tried to get a couple to use Trust Fountain without reading the directions. A woman at Explorations of Social Behavior expected to engage with or be acknowledged by the person she was sharing headphones with, and walked away because “it just wasn't pleasant to sit with her and be ignored.”

- *We tried to explain the squirt thing to a couple . . . or rather tried to keep them from reading the instructions and wanted them to just do it . . . but they didn't really listen. [Exit] [Trust Fountain]*



SoS Experiments Evaluation & Findings

Evaluation

Goals

The overarching goals of the Experiment evaluation are to

- evaluate the degree to which Experiments engage participants in short-term (month-long) and longer-term (6 months later) behaviors regarding resource use and sharing;
- assess the success of the Experiment experiences in fostering metacognition and helping participants make conceptual connections to real-world issues of cooperation and resource sharing (scale up).

Additionally, desired impacts for Experiment participants described by project PI's included

- changes in behaviors relating to resource use and sharing;
- intention to take others' perspectives into account in future sharing interactions.

Data also evidenced several of the desired impacts listed for SoS exhibit users:

- Interest in and knowledge of different ways of cooperation, competing, or sharing
- Interest in and awareness of collaborative problem solving
- Engagement with interpersonal interactions involving sharing and problem solving
- Interest in factors affecting social interactions
- Visitors observe and discuss human behavior
- Practicing the skill of metacognition/self-reflection in realizing how one thinks, or others think, and acts regarding resource sharing
- Practicing skill of taking others' perspectives into account while sharing resources with others
- Awareness that behavioral research explores these issues

Studies

The summative evaluation looked at two Experiments: Frenemy, which took place during February of 2014, and Do You Know What I Know You Know (Do You Know), which took place during May of the same year. We conducted follow-up phone interviews with participants from the two different Experiments immediately after the games ended and again six months later (n=30). In addition, we analyzed “confessional” posts from both games (n=200). For more detailed information and interview protocols please see Appendix C.

Interview Participants

Of the Frenemy players who volunteered for the telephone study, we randomly selected 30, hoping to connect with 20 within two weeks of closing the game and again six months later. Twenty people participated in the first interview; 16 in the follow-up interview. Do You Know had many fewer participants, several of whom had already fallen into the Frenemy sample. Ultimately, 10 participated in the first phone interview and six in the second. Please see Appendix C for detailed information.

Quite a number of Experiment participants and interview volunteers were professionals in the area of museums and/or had experience with web design. Eight people fell into this category. They are evenly divided into the Frenemy and Do You Know samples. We determined that if those individuals were not directly involved on Experiment or SoS project teams, they could participate in this study.



Summary of Key Findings

Goal: Evaluate the degree to which Experiments engage participants in short-term (month-long) and longer-term (6 months later) behaviors regarding resource use and sharing

There is no evidence of behavior change related to resource sharing, or intentions to take into account others' perspectives regarding issues of sharing. Some respondents felt like they might be a little bit more aware of interpersonal dynamics around collaboration or competition moving forward.

The foci of the two Experiments we studied, Frenemy and Do You Know, gave emphasis to competition and collaboration. Players considered those things, and communication, much more than they did sharing. Frenemy players sometimes made note of preferring strategies wherein points are shared evenly, i.e., choosing to friend all the time, but they didn't tend to dwell on this. The extent to which they scaled up around this topic was to mention that in life they like to be friendly (or avoid conflict) and sharing points in the game created a win-win situation, which made them feel good, and good about themselves.

Goal: Assess the success of the Experiments in fostering metacognition and helping participants make conceptual connections to real-world issues of cooperation and resource sharing

Each of the 30 participants interviewed for Experiment month metacognated extensively about collaboration and competition, both within the games and in relation to the wider world. Experiment. They actively contemplated their own and others' natural proclivities in cooperating and competing, sometimes experimenting with varying approaches in the game. Their musings included considering motivations for competitive behavior in themselves and others, both in the context of the games and in life. Respondents thought deeply about personal biases and stereotyping; considering how and when they can be influenced by them.

Impact: Interest in and knowledge of different ways of cooperation, competing or sharing

Most interview participants were very aware of, and thought deeply about, different ways in which they, themselves, and other people compete or collaborate. Figuring out the games and how they wanted to play them—including defining what it meant to win—gave Experiment participants a means of reflection on what type of person or what type of competitor they believe themselves to be in the real world. They also thought about how other people think and compete naturally, sometimes also noting that people can choose how to behave, or that conditions can affect their behavior.

Impacts: Interest in and awareness of collaborative problem solving & Engagement with interpersonal interactions involving sharing and problem solving

Collaboration to achieve a goal was most often referenced by people who played, Do You Know, which had obvious goals for a group to achieve; a feature less prevalent in Frenemy. Respondents considered their own perspectives, preferences, or approaches to collaboration and competition, for instance, avoiding conflict or being stubborn as well as projecting about these things for other people. Do You Know players struggled to figure out how to match each other and meet the challenges, sometimes experimenting with various approaches. Being unable to communicate with other Do You Know players was aggravating. A few people resolved this by using confessionals to signal teammates.

Impact: Interest in factors affecting social interactions

Experiment players were attentive to factors that can affect social interactions in a variety of ways, primarily related to stereotyping. Considering bits of information about the other players in Frenemy made some people self-aware of how they judge others, or could be judged by them.



Impact: Players observe and discuss human behavior

Experiment players considered collaborative and competitive behaviors in the games and human nature to collaborate or compete in general. Conjecture about possible motivations for observed tendencies or behavior was often a part of respondent thinking and confessional content. Experiment players categorized themselves and others as being competitive or nice, etc. Frenemy players often found that people were friendlier than expected, a reminder that people are essentially good.

Impact: Practicing the skill of metacognition/self-reflection in realizing how one thinks, or others think, and acts regarding resource sharing

The Experiments we studied emphasized competition and collaboration more than sharing, but a few participants did touch on sharing. Frenemy players often opted for a friending strategy because that made them feel better, and they felt that sharing the points as a result was a nice bonus.

Impact: Practicing skill of taking others' perspectives into account while sharing resources with others

Respondents considered the perspectives of others in the context of collaboration or competition more than in the context of sharing. For instance, most Do You Know players thought a lot about why other people made the choices they did and sometimes tried to anticipate and match them.

Goal: Assess the success of Experiments in fostering interest in science and/or the social science research associated with the exhibits

Impact: Awareness that behavioral research explores these issues

Many people who gravitated to the Experiments were already interested in social science. A majority were motivated to sign up because of a desire to contribute to the research (and because it sounded fun or interesting) and expressed interest in the results.

Detailed Findings - Follow-up Phone Interviews

Experiment participants metacognated about themselves as collaborators and competitors

Every one of the thirty Experiment interview participants metacognated extensively about collaborating and competing: how they do it, how others do it, why, and how it makes them feel. A small number of respondents also considered sharing. Most of their musings were about behaviors and motivations in the games themselves, but participants readily scaled up to personal situations as well. Very few study participants made connections to resource sharing outside of the game, or global issues of conflict or cooperation.

As they struggled to understand the games, players examined what it meant to win: gaining the most points, sharing points, feeling good, getting your way, helping the team succeed, etc. This type of musing and resulting strategy choices gave participants a means of consciously confirming or expressing things about themselves, and how they choose to live generally. For instance, in Frenemy, enemying can win more points, but many people said that they generally dislike conflict and/or think of themselves as friendly, supportive people in real life; for them friending felt better than enemying. Friending also had the perceived benefit of making more points available for more players. Frenemy players who opted to win by maximizing points for themselves made note of the fact that this was a game after all, enemying people didn't really cause anyone any harm.

Rather than focusing on how the play made them or others feel, most Do You Know players pondered their own and other's logic when making selections in the game. Playing Do You Know tended to make players think and talk about themselves and others in terms of being competitive or collaborative by nature. Generally speaking, they drew conclusions about themselves and others as being predictable



based on patterns of behavior. A few people consciously chose to buck perceived trends at one time or another during game play.

In most cases, respondents noted that participation confirmed things which they already knew about themselves or their conceptions of human nature; a few felt that they gained some insight or better clarity. Several players surprised themselves by reacting strongly to the games, or just being willing to participate in them for an entire month. Playing Do You Know daily even made one player consider himself as more collaborative than he had previously thought. One Do You Know player was made to contemplate her own thought processes; she confirmed her suspicions that she indeed does think outside the box, based on comparing her approach to the “generic” thinking she saw happening in the game and among drivers on the freeway.

Respondents metacognated about their play and strategizing in the game

Frenemy players were more likely to go into the game with a strategy in mind than Do You Know players. Three players relied primarily on tit-for-tat⁸; they tended to be focused on gaining points.

- *F12: . . . listening to the prisoner’s dilemma on NPR . . . and it turned out that tit-for-tat . . . in the long run that strategy should pay off and be the best. I came from that thinking that, you know, I would try to get some extra points at the end of the rounds, and then I’d go too early, and I started internalizing it too much. “God, I could’ve easily scored . . . been friendly the whole time and scored more points.” So I psyched myself out. [In the end how did you decide to play?] I just went back to tit-for-tat, but I should’ve stayed with it the whole time and been consistent; it would’ve been much more fruitful.*

Several people settled on friending all or most of the time because enemying made them feel badly about themselves, or guilty about doing so. Consistent “frienders” also tended to appreciate the fact that if everyone friends all the time, then everyone gains in terms of points. Many commented on the fact that most players were friending most of the time; at least one person was thus influenced to do the same.

- *F20: ... when somebody played enemy, I sort of felt like somebody pulled something over on me, because they got more points and I lost points. So I didn’t like that. But whether it’s a good strategy or not, my sort of childlike or childish take was, “Well, if we just always all played friend, we would all get a good benefit from it.”*

Two Frenemy players described changing their strategies because of epiphanies they had about the game. One decided that the stakes were low, so she changed to a competitive strategy. However, she had to experience getting enemied before she could do it to anyone else. Conversely, another player stopped focusing on points after realizing that the likelihood of winning was extremely low; that person changed to a less competitive strategy focusing instead on how it made her feel.

- *F11: I think I mostly chose friends, just because it was sort of like what I would want the other person to do. As in real life, do unto others. But then when I realized that the stakes are really low, that there’s really nothing to lose, and it’s totally anonymous, and you’re not truly inflicting any harm on anyone, because it is just a game. It’s not like you’re being mean.... I don’t think I ever would have done that had others not also done it to me first, and I realized what the effect was that I would be causing.*

Do You Know players were more likely to describe being confused about how to play, or experimenting with different approaches at the beginning of the month. They often discovered things about the game over time, which affected how they made choices during play. One interview participant was frustrated that others didn’t seem to understand what to do at the start of the month. Two others described finally

⁸ A tit-for-tat strategy calls for the player to retaliate in kind, e.g., begin with friend and continue friending until enemied.



figuring out that the idea was to match others. Confessionals and email from the MLS team helped at least one player in this regard.

- *D1: It was really hard, and I never got anywhere. I don't think we ever got beyond the first question. And it got really frustrating. And I don't know if I misunderstood the principle of the game, or one of the people in the game misunderstood the principle of the game, but we had three people, we could never line up. . . . There was no way to pass information and coordinate among the three of us, so it was this very frustrating experience. . . . The second week, when I was only playing with one other person who clearly knew what he or she was doing, it was much more fun because there was a sense of progress.*
- *D8: . . . I noticed in some of the confessions people would talk about the answers they were putting and things that were very common and things like that. I noticed when I got the email about which answers were chosen, it did seem that people were choosing the top most, top-right square, the one on top. So I kind of went with that, if I had a feeling that my partner was doing the same thing.*

One Do You Know player, who remembered finally figuring out that people were trying to choose obvious answers in order to match each other, adopted that approach and then discussed it with a colleague who was also playing Do You Know. They talked about the fact that there are no rules forcing players to try to match each other. As a result of that conversation, the colleague made a conscious decision to be less strict about trying to match others' choices, occasionally selecting responses that she liked, "because I want to."

- *D4: ... what I finally realized was going on is I... was like, "That's my favorite color. Why is nobody else picking green? Isn't green everyone's favorite color?" No they weren't... it was two or three times and people were picking red, I was like, "They're picking red because it's the top color. I'm just going to pick the top color." And so every other game after that, I would choose red.*
- *D9: ... she and I had a conversation one day about the colors, and she said, "I wanted to pick green, but everyone's picking red because it's the top one, but I love green, I want to be picking green," and I said, "You should just pick green, then." And she's like, "No, because then I feel like I'm breaking the rules." It's interesting because there wasn't a rule. Then it just kind of became a thing, and I was like, "I'm picking red, then, or I'm picking blue because I want to."*

Upon learning that a good friend had managed to complete all the matches in ten moves, one Do You Know player changed her play to be more competitive, "so immediately it became like, 'Oh, well, I can do it in 11.' That kind of healthy competition I love." In contrast, another Do You Know player ultimately decided that collaborating on the challenges was more important than getting her way.

- *D5: I never really focused on trying to be the lead until the one time when we did it. And then I probably focused maybe once or twice again. But for the most part, no. Just trying to get to consensus. It was more important to me to complete than to win [i.e., force the selections I want on my partners].*

Frenemy players reflected on what it means to win

Whereas, Do You Know players tended to shape their strategies upon figuring out that the goal was to reach consensus, Frenemy players were more likely to ponder what "winning" meant to them personally, sometimes specifically comparing cooperation and competition. Those people kept or moved their focus to feeling good about their choices, rather than gaining points. One person concluded that winning wasn't getting points, winning was being a "friendly actor in the game."

- *F5: It's a funny thing between cooperating and [competing]... Like am I in this to win or am I in this to maximize the total points scored by all players, kind of thing? [prompt for answer] No, I didn't. Again, I picked that one strategy [tit-for-tat] and tried to stick to it. In a sense that's the nature of the thing. That's why they call it a dilemma, I guess.*



Respondents reflected on their self-identity as collaborators or competitors through considering game strategies

All interview respondents felt that participating in the Experiments activity confirmed things they knew about themselves. Players in both games were made to consider themselves in terms of being confrontational or collaborative. Frenemy players tended to speak in terms of being friendly or avoiding conflict. Do You Know players gave more emphasis to feeling collaborative or stubborn. Some players let that guide their strategy in the game.

- *F3: I think it makes me reflect on who I am as a person now and in my past, and how that affects who I am now as well. I don't like conflict. I like debating. I like the actual sharing of how you feel about something, and just the discussion part. I do like being right, but for the most part I don't like conflicts. I don't like people being upset with each other. So I feel like that's why even if I didn't know this person and they kept choosing enemy, I tried to make myself choose friend as often as possible to avoid any sense of conflict, even though I knew there wouldn't actually be anything coming out of it.*
- *D3: . . . I can be somewhat stubborn, so I thought that I would be [that way]. . . . I don't know why I felt that, because typically I work collaboratively, especially in grad school, you have to work with people, and I'm always compromising. But I remember thinking when I started that, "I'm not going to compromise ... And that totally ended up not being true. I totally was willing to compromise all the time.*

These two Do You Know players confirmed things about themselves by thinking about and acting in the game. One person felt that she had confirmed her nature to be very self-aware by not behaving in the game as she would have expected herself to do. Another player, who felt suspicious about the other players and wondered whether he was playing against a computer, found Do You Know to be a “demonstration” of his skeptical nature.

- *D1: I think I confirmed things about myself. I don't think I learned anything. But I'm also someone with a very high level of self-awareness to begin with. So I might not be that target audience. But I didn't act in the game in any way that was untrue to myself or the way that I process things.*
- *D6: I knew about myself, being highly skeptical. [laughs] In any case, I was more sure of, like, about the choices that I was presented. I was wondering constantly whether they were genuine choices by others... It was definitely a good sort of demonstration of [my skepticism].*

A few players surprised themselves by their strong reaction to being enemied or by their sometimes stubborn behavior in making choices in Do You Know.

- *F9: I thought I didn't take that sort of stuff so seriously out of strangers, but apparently I do. ... [Choosing] Friendly to start out didn't surprise me at all. I'm not particularly confrontational in my real life. So that didn't surprise me. ... the part that surprised me was how much I cared what happened, that I had that strong of a reaction to [being enemied].*
- *D5: ...But this day I just was. And so I put three. And she put five. And I finally put five, just to move on. ... So we got to the vegetables. And I just started typing the names of any bizarre vegetable I could think. I was typing, "Brussels sprouts." ... I finally got her to quit. I got her to quit the game. And then afterwards I was like, "I kind of feel like a shit right now." But it was fun while it was happening. Because it's a game. ... I usually go for consensus. If I believe in something, I will stand my ground until the ground falls out from under me. But this is a game. ... And so, yeah, [my being so stubborn] very much surprised me. I mean, I actually said something to my personal trainer. I saw her that afternoon. And I said, "Man, I can't believe what I did this day." And she thought it was pretty funny, because it was definitely out of character.*

Simply participating in or being invested in this anonymous online experience was out of the norm and somewhat surprising to two Frenemy players and two Do You Know players. For one person, the fact that he committed to Frenemy for the month made him think of himself as more collaborative than he had done before.



- *F8: I normally don't do things like e-months, ... So I learned something about my willingness to participate in that kind of community in that way. ... It goes against what I believed about myself. I don't know if it was surprising so much as it was shining a light in a different place. [Interviewer: Do you feel like you would characterize yourself more as a collaborator or a cooperator now, after seeing yourself behave that way?] Yeah, I would say that's true.*

This Do You Know player had to ask herself, “am I really different?” She had always suspected so because of the way she chooses to drive on the freeway – avoiding being in “clumps” of traffic like everyone else seems to do. In a similar vein, contemplating her choices compared to others’ in Do You Know brought her to consider other people as “generic thinkers.” She concluded that she is not a generic thinker, however, when playing Do You Know, “maybe the easiest thing is to go with the flow.”

- *D4: Like, am I really different? Or when we try to do groupthink, is everyone just generic? I just wondered if I was different. I don't really think so. ... I've never thought of myself as a big outside-of-the-box thinker or a big not-go-with-the-flow kind of person. But in traffic ... whenever I'm on the highway, groups of traffic travel together in clumps. ... which I happen to think is incredibly dangerous. I don't want to be driving along with anyone beside me. ... So it kept making me think of that. Like, maybe I am different, because I don't want to go with the flow with traffic. ... So I just kept thinking, "Maybe people really are generic. Maybe people really always do pick the top right and the right one and the one at the top. Maybe the easiest thing to do is to go with the flow." ... I had wondered that about myself considering traffic, but just with traffic. ... So as I'm picking things [in Do You Know] being an individual didn't work for me. Being different didn't work.*

Experiment month participants thought about other players in the games

A large majority of Experiment month players in the interview study (25 out of 30) gave a lot of thought to the other players in the games and were aware of doing so. Participants in both games found themselves wondering how other people knew how to play, if they had played it before, and if they were having similar experiences. Reports from MLS staff, e.g., the statistics regarding how many people were friending, and the confessionals, provided insights for some people about how others were playing the game, and why.

Many Frenemy players were surprised by how friendly other people were being. Do You Know players also considered the motives of other participants, how other people approached the challenges, and how they made choices. Respondents typically focused on what logic others might be using, and in turn contemplated their own reasoning. A few people referenced patterns, seeking or noticing patterns and trends in the choices of others. Choosing colors, naming the baby and choosing a rescue site were all mentioned.

Playing the Experiment month games brought people to consider personal bias and how that does or can influence them or other people when reacting to or dealing with others. Frenemy players were very conscious of being influenced by the bits of information they received about others, or making a concerted effort not to be. In describing this, respondents use political affiliation and cars or commute types as examples of areas in which they know they can or do harbor biases.

Participants in both Experiment months described feeling connected to the other players in a variety of ways. Frenemy players tended to have a very emotional tone, e.g., feeling warm and fuzzy at friending and being friended. They noticed that most people tended to friend, especially toward the end of the month. One player thought it seemed like everyone “was coming together or just feeling more good will toward all the other players.” Do You Know players described feeling connected to other players with less emotion than Frenemy players. They emphasized a feeling of communication and/or collaboration. For some players the confessionals played a role in this.



Respondents considered how others were playing the games

Much thinking about the other players in both Frenemy and Do You Know revolved around the mechanics of playing the games. A few participants in each of these Experiment Months wondered about how other people knew what to do, or were aware that others were confused about it.

- *F5: It was more like sociological interest. What are other people thinking about this? It didn't make me think of the game differently. It just was interesting to see what other people were doing, and some of the misconceptions. I remember there was one where the guy said somebody said, "Well, there's no reason not to just pick enemy all the time, because if the other person ever picks friend, then I'll get points, and otherwise nobody gets anything," or something like that. I almost wanted to write back and say, "No, no. Look at it again. That's wrong."*

Frenemy players thought about and reacted to bits of information about other players, and readily considered personal biases

All Frenemy players were very self-aware about how they used or didn't use the bits of information about the other players, which were occasionally provided. One person consciously tried not to use them overtly, recognizing his usual personal bias against certain political affiliations; another was made to wonder if she would have been swayed by political affiliation information. A third person questioned her negative assumptions about SUV drivers when those players consistently chose friend in the game. One player felt that the information did not affect her play, but it did make her wonder if her partner judged her for not being a bicycle commuter. More than one respondent was cognizant of judging people positively if they had things in common, even feeling "kinship" in one case with other bicycle commuters. Information about other players made one person "theorize" about them, but how they played is what determined how he responded in the game.

- *F7: Yeah, I was curious what other people had signed up for this, and why, and what they were thinking for their strategies, especially when there was a little fact. I think there was one where the person drove an SUV or something, and I'm a bus commuter. And I know it's a stereotype of SUVs being selfish, gas-guzzling people, but they were friendly the whole time. But it made me wonder what— who's on the other end of this computer thing.*
- *F13: There were definitely times that it definitely didn't [make me wonder about my opponent], and there were a couple times I was like, "Oh, they're like me," that I definitely felt more sympathetic towards them. I'm not sure that it actually changed my moves, but I definitely felt a kinship to the person who also bicycled to work or a person who had the same political leanings as myself.*

Frenemy players were surprised by the friendliness of other players

How other people chose to play the game was on the minds of most respondents. Many Frenemy players were surprised by how much people tended to friend rather than enemy. Confessional posts gave people insight into how others played, and let them compare their own mindsets with others'.

- *F15: I did [look at confessionals]. And that was kind of fun. It was really interesting to see kind of how—some people had similar thoughts to me, and some people thought, "Why would you ever friend?" It was a really different reaction. ... It didn't change how I thought about the game, but it was interesting for me to see how different—because to me, my conclusion feels really logical. So to read there are people playing this game with strangers online who are really kind of cutthroat about it, was interesting. It's not that I wasn't expecting someone to be kind of cutthroat about it, but it was just so different than my outlook. It was interesting to get a window into that.*

Do You Know players pondered why other players make the choices they do

Do You Know players thought about why other players made the choices they did. Wondering if someone was choosing their favorite numbers made one player try to consider that person's logic. Considering how to go about choosing a common name for the baby girl forced one player to think in detail about a logical approach that she assumed others would have been using. Another player wondered if his opponent was making choices to be bothersome, "are they pushing my buttons?" At least one player thought long and



hard about why people selected different locations to wait for rescue. He discussed it at length with other people and concluded that “people’s collaborative ideas can be very different.”

- *D3: I think just the number was interesting. It’s interesting; a lot of people choose seven or 13. If they didn’t choose one of those numbers, 1, seven or 13, I was like, “I wonder if they’re just choosing their favorite number.” So I would think about their logic processes in choosing things.*

This Do You Know player also spoke at length about trying to observe patterns or trends among the choices made by other players, and then match it. She mused about the process of the game not being to change the other person’s mind, but to “change the way they’re playing back at you.”

- *D9: ... because I would sit there and think, okay, what might someone do next? And it was just a way to make it more of a gaming, you know, have a little bit of competition in it, have a little bit of gamesmanship, of just trying to see if you could assume out where you’d fall and then get it from there. ... you’re not really changing their mind so much as maybe trying to change the way that they’re playing back at you. So I think for me, it was kind of fun, because it’s not a real life thing. It’s more of a gaming kind of thing, trying to get around people to see if you could push somebody to flip on you or that kind of thing.*

Respondents described sensing community, communication, connection with other players

Though a very small number of respondents specifically stated that they did not feel emotionally connected to the games or the other players, most Frenemy and Do You Know players did. They referenced participating in a community, and described having a sense of communication or connection with the other players.

Frenemy players talked about feeling warm and fuzzy, having unspoken communication or connection, or just feeling good about “doing so well” together when they had a string of “friendings,” and/or feeling disappointed if that string ended with an enemy play. Several commented that by the end of the month people were mostly friending. One respondent felt that everyone “was coming together or just feeling more good will toward all the other players.”

- *F18: I would see, I mean certainly there was on some level, and mostly just kind of on an entertainment kind of level, because you don’t know who this person is. But if we both kept hitting friend and then we both kept hitting friend, there was this kind of unspoken communication of, “Cool, we’re both taking it easy today,” there definitely was a connection there.*

Do You Know players tended to give more emphasis to a feeling of communication and/or collaboration than to a sense of community, though they also felt good about matching other players. Some observed a trend toward more common answers over the course of the month. At least one person described writing and reading confessionals, and attributed the community feeling to that.

- *D7: [When we got 10 out of 10] ... it gave me a laugh because it was like, “Look, we won.” And I wasn’t trying to be competitive. ... And then I think I even posted [a confessional]... “Hey, good job. We finally made it across the river,” or whatever. ...It felt more like community and less like just talking to a computer. So, yeah, I appreciated having [the confessionals] there. And appreciated the humor that I found there sometimes.*
- *D1: The second week, when I was only playing with one other person who clearly knew what he or she was doing, it was much more fun because there was a sense of progress. That felt good, it felt good to realize you’re on the same page. There’s a social component to games like this, and it feels good to match, essentially.*

Experiment participants scaled up to their personal lives

Over half of interview respondents scaled up in some way while participating in the Experiments (17 out of 30). Participants in both groups made connections to life outside of the games, most often in a personal or work-related context, and usually related to human nature regarding competing or



collaborating. In addition to making observations about people in general, respondents often made statements about themselves, e.g., type of person they are regardless of the game itself (“I’m a nice person,”) or how they like to operate (“I prefer to cooperate...”).

Frenemy players scaled up to their personal lives, consciously examining the way they operate in the world – one respondent referred to Frenemy as a “metaphor for life.” They listed broad personality traits like trying “just always to do the right thing,” and enjoying being a good team player. One person got more detailed, explaining that engaging with someone who can give him positive feedback can help pull him out of a bad mood, something about himself which was highlighted by playing Frenemy.

Frenemy players contemplated human tendencies and motivations around collaboration, including being good/bad, or selfish, also noting that one can choose between them. It was obvious to one person that wealthy people got that way by choosing a competitive strategy in life at the expense of others. The fact that most people in the game friended most of the time confirmed for at least one participant that people are essentially good. One noted that anonymity makes it easier for people to be mean.

Do You Know players tended to muse less about motivations or emotions, and more about observable patterns and social influences. Some also noted that people are predictable creatures of habit, and that some are natural leaders or followers.

Considering bits of information about the other players in Frenemy made some people self-aware of how they judge others, or could be judged by them in real life. It’s human nature to be interested in other people, noted one player, but it can distract from more important issues, as in the case of tabloids which publish “garbage.” One player pondered the fact that unlike in the game, in real life, she has more than one piece of information about a new acquaintance so she would be able to find a way to connect with them, even if they had a different political affiliation. Another was reminded that people aren’t necessarily bad just because they have different views.

A few players were simply reminded of things they have experienced in life outside of the games. Examples include trust-building exercises, an episode of the television show Glee, titled Frenemy, and the common occurrence of choosing baby names. Two players described playing their games as a catharsis for real-life frustrations: one as a way of getting back at someone who angered her, the other as a way of expressing optimism and positive emotion in response to the sadness she felt over her real-life friend’s terminal medical diagnosis.

Thinking about human nature made Experiment players scale up about behavior outside of the game

Reflecting on the act of choosing to friend or enemy brought several Frenemy players to consider common behaviors and motivations that people exhibit in the game and in real life. Upon seeing the game statistics shared by MLS staff, one player was surprised that people were being so friendly which she took as a reminder that most people are good, further noting that what gets into the news are negative stories. Another player referenced her past as an active participant in online forums; she loves to debate and observed that “it’s so much easier [for people] to be mean” in an anonymous situation such as Frenemy than when talking face-to-face.

- *F10: ... when they sent out the statistics about the game, I was like, oh, more people want to be friends than they do enemies. I do think about that sometimes. In the news you obviously hear terrible things, but you can always think like more people want to be friends than they do enemies. So there are essentially more good people than there are bad people. We just hear about them.*

Drawn to Frenemy because it relates to every-day life, one woman related the game to her crowded office conditions which create a competitive atmosphere. Frenemy made her think about the fact that, people have the choice to behave collaboratively or not. Putting one’s self ahead individually was much on the mind of one other player who felt strongly that “some [people] really will do pretty much anything for their own gain, while others are more of a cooperative bent...” He was adamant that wealthy people



achieve financial success by competing unfairly with others. The tendency for people to adopt a philosophy of scarcity moved another player to scale up to policy issues regarding resource sharing; see Frenemy players scale up to global issues of conflict and resource sharing below.

- *F19: ... one of the reasons why I was drawn to Frenemy is I feel like it speaks to something that we see in our lives every day. ... I don't have my own office, I share an office with four other [people], and we work very closely together, and there's a lot of competition. And I guess it sort of made me think about, we all have a choice, whether we choose to engage positively and supportively... I think the more we try to put ourselves ahead individually, it kind of detracts from the movement of the team. ... [Interviewer: Does that relate to something you said earlier? You used the term, "the spirit of cooperation."] It does relate to that.*

Bits of information about others in the Frenemy game got one player thinking about work, where he interfaces with people of opposing opinions as a part of his job. The game was a reminder that, “people who don't have the same world view as you ... can still be nice people.” Another person responding to the information about other players said “it's human nature; we just want to know about the people around us” but noted that it can become distracting and unhelpful, as in the case of “tabloids about Kim Kardashian.”

- *F12: During a round, you would see one, like if they're Democratic or Republican or whatnot. And then what kind of car they drive. And I forget the third piece of data. But I was like, Ach! No, you know, that's why people love tabloids and stuff. It's garbage. I should be focusing on things that are really changing in our world, and how we can change the world for better—no, we like to watch tabloids about Kim Kardashian. It's ridiculous. But that said, it's human nature; we just want to know about the people around us. ... I'd try to see if that would make a difference on my decisions during my plays, like enemy or friend. But it really didn't.*

Watching the Olympics while Frenemy was in play got one player to consider the nature of competitiveness. Even though team mates have to be supportive of each other, she feels that there must be competition between them as well, even among Team USA members.

- *F19: There was something that happened in the news that did make me think about playing the game, which was that it was, we played the game right around the time that the Olympics were being broadcast, and I thought several times about different interviews I saw with athletes, and how interesting it is that teammates seem to be so close, and there wasn't a whole lot of focus—none that I saw, really—on sort of like nasty competition between teammates. But it did kind of make me think about how, you know, surely they've got [to be competitive]— especially thinking about the Team USA and how supportive athletes appear to be of each other, and I don't know if that's just how the media portrays it; otherwise it's just not a very nice story. But it did kind of make me think I wonder how people—they've got to be close with each other, and without that sort of anonymity, it just feels complicated to me.*

Do You Know players also considered human nature around making choices, but they did not focus on motivations of personal gain or collaboration. Rather, they were moved to consider observable patterns in, and social influences on decision-making. One participant confirmed that “people make choices based on common and predictable patterns.” Predictable patterns in the game and in life—according to another player—become or indicate trends. She spoke extensively about her own interest in patterns and trends, and how she noticed patterns emerging during the game and followed them. For her this was ironic in a world full of people who consider themselves to be individualistic. She also referenced ongoing cycles in clothing trends and more recent trends; such as, microbreweries and being green.

- *D9: I think I realized that, maybe not just for me, but that we are very much creatures of habit, and creatures of trying to follow a pattern. I think we get very comfortable in our patterns. That's what I found, because that's how I felt through the whole game. Every time a pattern would emerge, even if it was only two or three times, you'd start to see it. ... As soon as I saw a trend starting, I followed it, which is interesting because everyone wants to think that they're super individual, and that we don't follow trends, but we do. ... I think I certainly don't know everything, but you have an idea of how, as a society especially, we have trends even when we don't want to have trends—even when you go against*



trends, there's a trend, kind of thing. Going against the trend is a trend. ... So it just feels like we tend as a society to trend in and out of things. Not all at once, but it feels like that sometimes. It feels like we're all swimming up the same stream sometimes. And then we kind of break off as well.

Do You Know made a few people think about leaders and followers; people tend to be one or the other. One player had expected to find more leaders participating in Do You Know than he did because he assumed it would attract that type of personality.

- *D5: Well, I'd say that mostly we all want to get along and meet somewhere in the middle. But there are some definitely who want to tell everybody what to do. And there's some definite people who just want to be told what to do. That's kind of what I saw. [Were these new thoughts for you through the game?] No, I believe that anyway. I mean, that's how life is. You have leaders. You have followers. You have doers. You have consumers. And all that kind of stuff. But it was just interesting in [this team], because I assumed that everybody who signed up to do it was probably some kind of leader. For some reason it made me feel like, if you're stepping out and putting yourself into a place like that, you must be some kind of leader. But that wasn't the case. [Interviewer: How do you know that wasn't the case?] Because everybody didn't force everybody to follow. ... Yeah. More collaborators than I expected.*

Frenemy players scaled up regarding themselves as actors in the world

Several Expermith participants scaled up into their personal lives, consciously examining the way they operate in the world – one respondent referred to the Frenemy as a “metaphor for life.” Such thoughts were triggered by the play itself, emotional reaction to the play, or by considering the bits of information sometimes included in rounds of Frenemy. Players were moved to consider broad personality traits like trying “just always to do the right thing,” or enjoying being a good team player. One person felt that playing Frenemy “fueled” his way of engaging with people, explaining that engaging with someone who can give him positive feedback can help pull him out of a funk.

- *F1: ... it doesn't take much to have a dark cloud follow you around the rest of the day if you let it. But I'm finding that if I can get myself out of that funk and try to engage with somebody who I can get positive feedback from on some level, that that'll pull me out of that. I find that that's a much better place to be than to let the funk sour the rest of my day.*

Two respondents were moved to think about themselves in response to the bits of information they had about the other players. As noted above, one Frenemy player wondered if she was being judged for not commuting by bicycle. The other player, who contemplated her own way of operating with people because of the information provided in the game, described using those bits of information to dictate her play. For example, if the other player had a different political affiliation she would enemy them, whereas, in real life she would have access to more information about a new acquaintance, so she would be able to see past that and be friendly despite that difference.

- *F16: Oh yeah. I mean, if the only thing I knew about you was what your favorite color was, typically I still friended the person. But when it was political, if it was something that was different than what I am, I made sure that I marked it as enemy. ... in life, I obviously have people that are not enemies who share different political views than I do, obviously. But if the only thing I know about you is that your political views are different than mine, then yeah, if that's the only thing I have to go on, then if I had to choose, I would choose enemy. [Interviewer: So when you know a person in real life, you know more about them than just their political affiliation? Is that the difference?] Right. Even if [political affiliation is] the first thing I know about a person, I tend to move past that to get to a place where I'm like, “But we can still be friends, even though you clearly don't vote the same way I do.”*

Respondents associated Expermith activities with real-life experiences

One woman was reminded of her experience with Frenemy by an episode of the television show, Glee entitled “Frenemy.” Naming the baby girl in Do You Know made one player scale up to popular culture and her own social life. Celebrities are naming babies and so are the people in her social circles. This person also made connections between the rescue page of Do You Know and “the outside world” by considering where she would want to be rescued off of a desert island, which in turn led her to Wikipedia



to read about plane crash survivors. Reading confessionals about the naming the baby “Girl” made one other player wonder if there were trick answers; she was reminded of riddles.

Respondents played out real-life experiences in Experiments

Quite a few respondents mentioned that they chose to friend people in Frenemy because in life they like to have a positive approach. Two Experiment players described more specific ways in which they brought their lives into the games, both were emotionally based. One Do You Know player described being upset with someone in real life and taking it out on the game, “using the game as an outlet.” Another participant used Frenemy as a place to exercise a sense of optimism, by answering the mood question and always choosing friend as a way of coping with, or responding to, her close friend’s difficult medical condition.

- *D3: I was focused on the win during that day. I don't know why I felt that I had to. . . . I'm trying to remember what I was going through. I think someone in my life had made me really annoyed that day, so I was using the game as an outlet. "If I can't win with this jerk, I'll win with the one on the internet." (laughs) . . . Absolutely, that was my thought process.*
- *F17: I've had a really very bad month of very bad news. I have a friend who's dying of brain cancer ... And I think [Frenemy] was my opportunity once a day to be optimistic. . . . How are you feeling? Are you feeling stressed? Oh, yes, I am. Are you tired? Well, generally a little after midnight, yeah, I am. But when it came to doing a yes or no, I had to be optimistic for my own well-being. . . . I'm a person whose cup is half full normally, and going through a . . . couple months of real stress—it gave me an opportunity once a day to be very positive.*

Two Frenemy players scaled up to real-world issues of conflict and resource sharing

Two Frenemy players scaled up to global levels without prompting. One person was focused on strategies involved in political and military conflicts citing recent unrest in Egypt and Ukraine, noting that the big picture “boils down to something simple.” This is how she approaches problems, including playing Frenemy. The other respondent who referenced global issues had been pondering people’s tendency to operate from a scarcity mentality, and the influence that mindset has on the political debate regarding public policy related to poverty.

- *F12: Yeah. Because I think it was ... when this whole war was going on and we had to figure out a strategy, if things, if bombs are going to fall. So there was a lot of unrest. Egypt came back up, and then Ukraine happened. What was right before that? There's been so many revolts around the world. ... It's a strategy that governments are even using, or groups that are looking to go against governments—strategy of course comes into play. They've already looked at the big picture, and it all boils down to something very simple. And a lot of times it does in my world, and I like to think simply about a problem and go with the easiest way of thinking, sometimes is the best. If you think about should you friend somebody first until they attack you, or do you want for a certain place and then attack?*
- *F15: I think it's applicable outside the game. ... how do I put this? It's putting up the idea that resources are scarce, but they're not. There's plenty of resources for everybody to get plenty of points. There's a lot of times where we think of situations and we're like, "Oh, if those people get [more], then I won't have as much," but that's usually not really true. Usually, if everyone's doing pretty well, we're all doing better. ... I was thinking about that while we were playing. I did a couple of confessionals. I usually would do a confessional when somebody was enemying me. I'd be like, "Oh, that was sad today." ... There's so much right now that's so polarized—in politics and social policy and people's outlooks. I feel like it's really easy to go down a rabbit hole of, "My side needs to win," or you're looking at ways to mitigate poverty, and people are thinking, "But I'm not gonna have as much if we help people who are destitute." I think it's a really sad approach. When people see it as, "If you have anything, I have less." There's a lot going on now in the world that feels that way.*



Experiment participants were focused on the science

A majority of Experiment players chose to participate because they were interested in the fact that doing so would help generate data for researchers. Interview respondents often asked about the research and how they could learn about the findings. The sample included people who work in psychology and game, or experience design. One respondent likened playing Frenemy to a psychological experiment in that he chose to think of the other player as a computer not a person, so he could dissociate from any potential impact his game strategy might have had on that person.

Respondents signed up to help with the science

A majority of interview participants were motivated to participate in these Experiments because of general curiosity about it, or familiarity with Experiments or the prisoner's dilemma. Most respondents also voiced an interest in social science and/or helping or participating in the research efforts behind the experiences. Additionally, respondents thought it seemed interesting and fun.

- *F18: Just that it was kind of a fun experience, and I thought it was cool that there was this type of, I guess, opportunity out there for people that were complete strangers, to interact and for people to kind of read the results of that. I'm into this social experiment kind of stuff. So it was intriguing to me.*
- *D6: It looked very interesting, and then I'd seen the password [Experiment]. . . . I'm a psychologist by training and I was very intrigued about the topic. So, I was kind of interested whether the findings gonna be similar than what I expected.*

Respondent associated Frenemy strategy with psychological experiments

One participant likened Frenemy to playing poker, something he has much experience with. During Frenemy, he considered "clicks" to be the chips and pretended that he was playing against the computer so he didn't have to "worry about the other person on the other side." That disassociation from the other players reminded him of things he had heard about torture and psychological experiments. He told himself, "don't let your brain go to the fact that there's another human playing the game... disassociate the human side of it, and you'll be better off."

- *F12: ... I put it in a box—I see it as like playing poker, and I don't think of the chips as money. A good poker player just thinks of them as units. And you can bet units, and then you disassociate the money 'cause then you're like, "Oh, never bet what you can't lose." And in this one, I just kind of associate it as clicks. Don't worry about the other person on the other side; pretend it's the computer. And then there's the other one, that's the torture kind of thing. Like if you tell somebody, "You need to push this button and shock somebody," that experiment. So I said, "Don't let your brain go to the fact that there's another human playing the game with you, and just kind of disassociate the human side of it, and you'll be better off."*

Second Interviews (six months after the Experiment)

Follow-up interviews six months after the end of the Experiments focused on insights that had stuck with the players, if and how those had affected their perceptions or behaviors in the meantime, and what type(s) of scaling up they had been doing, if any, during the intervening months. Almost every participant initially stated that the Experiment had not crossed their minds since our first conversation together. Many had forgotten there would be another interview. A few had thought about it a little bit in anticipation of the follow-up interview. Though a few respondents struggled to recall details about the games, most could easily describe game highlights and experiences they had discussed during their first interview.

Many people reflected on how things they discovered or confirmed about themselves continued to resonate with them in a general way as they move through life. During the months between interviews, many participants thought consciously about Experiment-related insights in terms of how they or others generally operate in the world, even if they did not specifically think of the Experiment activity itself.



Frenemy players tended to confirm that they themselves felt friendly or that others were friendly. Do You Know players confirmed their interest in people's tendency to have patterns of behavior that make up trends. No one described having new or different musings than they had shared during the first interview.

Casual experiences in real life since the first interview specifically reminded two respondents of Frenemy. One had visited an interactive museum exhibit and the other had heard references to the Prisoner's Dilemma. One person revisited musings about people's tendency to operate from a mindset of scarcity, again referencing public policy – this time, the recent news about minimum wage legislation.

Experimenth-related ideas and insights continued to resonate with players

Several Frenemy players reflected on friendliness. One person felt that seeing how Frenemy participants played the game made her perceive other people as more friendly. Two people reported that they try to be cheerful or supportive in daily life, giving attention to how that behavior impacts the people around them. One of these felt that playing Frenemy had influenced him a little bit in this regard. The other also harkened back to her earlier interview in which she commented on a "spirit of cooperation," which can "support everybody's success," and noted that playing Frenemy made her "think about how to work more collaboratively with others."

- *2F_13: I feel like I see other people as possibly more friendly. ... There's a lot of bad stuff in the world right now. Definitely the number of people playing that game who played from a friendly state surprised me. And I thought, "Oh, maybe people on the internet are less aggressive than I would have assumed."*

Do You Know players attend to how people live and/or make choices. Participating in Do You Know reinforced one woman's awareness of people as "predictable creatures." A Zen practitioner who had spoken in the first interview about observing patterns in her own and others' behavior as a part of her practice revisited this idea. Do You Know gave her another way to watch for patterns, but wasn't the source of her awareness of this phenomena. One participant felt that Do You Know was a good example of how "interactions can remind us of what we do and how our choices can be biased or influenced by others," also mentioning that she thinks about this a lot, but not because of the Experimenth; he works in games. Trying to anticipate what other people will do has been on the mind of one player who was very clear that these musings were directly related to Do You Know.

- *2D_9: [Interviewer: You talked about making assumptions about what people would do ... has that crossed your mind before we got on the phone together this time?] [Yes], it's crossed my mind. [Interviewer: As it relates to Do You Know?] Yeah, absolutely. I guess my way of looking at it is I'm putting my assumptions on how I think, and that's why it's an assumption, because you're trying to see where you think a trend might happen. But at the same time, everyone's doing the same thing.*

Respondents had specific experiences that related directly to Experimenth-type musings since the first interview

A few people described very specific instances where something in their lives made them contemplate Experimenth-related ideas. One Frenemy player, a lawyer, has been contemplating how poorly the bar responds to complaints and feels that this is because so many people act in bad faith. Another Frenemy player thinks about what motivates people and if they work to "benefit the common man." This person works in retail and feels strongly that by giving non-profit organizations a good deal, everyone benefits.

- *2F_14: These are topics that I guess I just always think about. And so I guess the most recent one would be—I'm a lawyer... I've been looking at how the bar deals with complaints. And it's just a horrible, horrible process. It's both under-inclusive and over-inclusive, and it just doesn't do what it says it's going to do. And it's because of so many people acting in bad faith.*

This player contemplated Frenemy-based lessons about how we respond to people of different backgrounds, to current events, and to his work. He has been responsible for hiring people at work, something that involves diversity training and meeting a variety of people. This prompted him to consider



ways in which different cultural backgrounds can influence the way people present themselves, and in turn how they are perceived. He explained that behaviors, “which seemed to be stressing or troubling or even aggressive or off-putting ... can be seen in a different light ... can be seen as just a different representation of culture.”

- *2F_8: I mean, I think the last six months has given anyone who follows current events the opportunity to evaluate how they relate to people who come from differing circumstances. And if you take the opportunity to think about that and understand that different cultural backgrounds might lead to different ways of presenting yourself or speaking or even behaving to a certain—I want to say—socially acceptable level that things which seemed to be stressing or troubling or even aggressive or off-putting before can be seen in a different light, right, can be seen as just a different representation of culture. ...It’s something I try to think about pretty regularly. In the last year in my job, I’ve hired five people to essentially replace my staff. So I’ve had a lot of exposure to equal employment opportunity and diversity trainings.*

One Do You Know player now uses her experience in the game as a sort of short-hand to identify and label people she encounters who are not acting logically. She was clear that participating in the game helped her recognize her own reactions to people who frustrate her in this way. This person also spoke at length about the value of Do You Know when it comes to helping people recognize their own reactions and roles when dealing with other people. She related it to “hyper-actualization and new media” (see below). She explained: “...This is a contrived situation that I wouldn’t normally be in ... yet it’s able to help clarify some truths that I might have already known, or even discover things that I might not have known.” She would love to have her graduate students participate in something like this as a tool for fostering critical thinking abilities.

- *2D_3 [During Do You Know] I was really surprised that people really didn’t seem to have an intuitive grasp of what the person would do, or what seems to be would be the logical choice, that you would choose this. I remember thinking, “Why would someone choose this, or why are they not getting that this should be the next step?” [Now] when I come across someone and I’m like, “Why is this person acting like this?” and then I’m like, “Ha-ha, that’s you, Respondent 3, you’re expecting the entire world to react just like you would react.” ... I would say that the game definitely helped me to recognize that pattern of thought that I already thought about people. In some ways, some things I would say that I knew that before, but perhaps helped me realize that when I was thinking this, I was, “Oh, I’m thinking of this way as this is the way I think about something.”*
- *2D_3 I wish I could give it to my students. ... I wonder how someone who doesn’t think the way I think would react to it. It’s very interesting, this process, because when you’re put into something that’s, especially an experiment design, where you are doing something and it might not be the way that you’re doing or thinking about something normally, it definitely is able to draw conclusions about other things, at least for me, that you wouldn’t think about necessarily, if not for being in this contrived context - hyper-actualization in new media. [laughs] Something like that. It’s funny, I’m thinking of—they did this YouTube version of the [Lizzy Bennett] diaries, it’s called the Lizzy Bennett diaries, but it was basically a modern re-interpretation of Pride and Prejudice. They had this episode where the Darcy character and the Lizzy Bennett character have this conversation, but they do it in a theater context and they talk about how it’s hyper-actualization and new media, and how the contrived circumstances that the audience knows this is a situation which they wouldn’t normally be in, but it kind of adds to the realism of the conversation. And so the “do you know?” game reminds me of that. The experience that they could take out of that is very similar to, this is a contrived situation that I wouldn’t normally be in if I wasn’t participating in the “do you know?” game, but yet it’s able to help clarify some truths that I might have already known, or even discover things that I might not have known. Interesting game. I liked it.*

Another Do You Know player who related a specific life event to the Experiment described an email conversation with a colleague. She was frustrated by trying to negotiate with someone electronically, and was reminded of the frustration she felt playing Do You Know and trying to negotiate without being face-to-face with the other person. She stated firmly that playing Do You Know helped her put into context her own tendency to seek agreement, to try to arrange a win-win, in contrast with others who can be



unyielding. Being aware of this helps her navigate at work, particularly when it comes to that difficult co-worker.

- *_ 2D_5: ...once, when I was actually negotiating with somebody. I work in a __, and we have six locations, and I needed a location, and this person insisted that they had to have it. ... And she just wasn't gonna bend. ... this was all on email. We were never face-to-face or anything. And so as it was going back and forth, there was one point where I just laughed. I was like, okay, I've been here before. [e.g. playing Do You Know] I try to come to, you know, agreement with people. I don't roll over. I try to come to agreements, so there's a win-win for everybody, in pretty much every aspect of life. And you just come across these people who want to win no matter what, ... I'd say [Do You Know has] focused it for sure. ... And I think "crystalize" is a great way [to describe it]. It just sort of put it into context for me. It's definitely in my thought process now. Not every minute of every day or anything, but definitely when I came up against this other person at work, I was like, okay, this is one of those. [Interviewer: So it sounds like it's kind of a useful tool?] Yes. Because I don't want to push somebody that I work with to the point where they walk away from me. This other person, I was like, yeah, whatever. I don't know you, you don't know me. But you know, I certainly would not want to do that in my real life.*

A few respondents were reminded of Experiments

Sometimes respondents were reminded about the Experiment games by experiences they had in the world without digging deeply into their own process or other insights. An interactive museum exhibit reminded one respondent about anonymously interacting with other people who like museums via Frenemy. Another Frenemy player is continually encountering references to prisoner's dilemma. He was one of two respondents to mention a British game show called Golden Balls which is based on it.

- *2F_3: I was at the Columbus Museum of Art last evening, and they have a lot of interactive components with their different exhibits, and a lot of them are Post-It notes where you comment on a piece of artwork. Or right now they have an exhibition on color, and they have these two immersive rooms where you walk into the room and it's all either purple or yellow. And then you write how each color makes you feel on a purple or yellow Post-It. ... [Interviewer: Was there anything in particular about Frenemy that floated through your mind at that time?] No, just the act of just that kind of, I guess the interactivity of it and seeing what other people had put. So interacting with other people that are interested in museums or Experiments without actually seeing them or speaking to them.*

Respondents revisited global scaling up

One respondent in the second interview revisited his earlier thoughts about people's inclination to operate from a mindset of scarcity. This time he specifically mentioned raising the minimum wage and the way the "people freak out ... as if that's going to suddenly make [their] paycheck smaller."

- *2F_15: Yeah. And it's more like perceived scarce resources, like there's not going to be enough for me. I have to have the most. ...there's a lot of stuff in the news and in politics where people freak out over, like let's raise the minimum wage, as if that's going to suddenly make your paycheck smaller. Things like that. Like it's a perceived scarcity of resources.*

Detailed Findings - Confessionals

Summary

Not surprisingly, given their quick and immediate nature, Frenemy and Do You Know confessionals were primarily focused on the game and/or the play itself (95%, 100%). The few comments in the sample which didn't describe play included personal references or reactions to play. In both groups, a majority of posts exhibited CP Awareness (81%, 60%) and/or CP Secondary (71%, 66%). Confessional content echoed the same broad themes, and even some of the detailed stories found in the Experiment telephone interviews.

By far the most common type of confessional content for both Experiment groups concerned one's own behavior or thinking about competing or collaborating within the game itself (79%, 85%), and/or that of

others (61%, 77%). Embedded in those game-play related posts were references to, or considerations of cognitive processes, one’s own and/or others’. People readily examined their own and others’ strategies and motives.

Frenemy players seem to be more likely to scale up to the world outside of the game in their comments, though very few posts touch on this. Nine Frenemy players and one Do You Know player wrote about competition/collaboration or resource sharing outside of the game. Most frequent were statements about their own mindset, i.e., the type of person they are regardless of the game.

One person actually scaled his/her behavior in the game up to a global level, stating that when s/he wins at the expense of others, “the world seems a tougher place.” Another person hoped to use Frenemy to reinforce positive behavior in real life.

Observing and considering how other people played frustrated a few people who expressed anger and dismay about their fellow humans, prompting two of them to ask probing philosophical questions about winning, collaborating, compassion, and happiness in life outside of the game. Life outside the game was on the minds of two confessors who were reminded of unhappy relationships, one of whom referenced issues with forgiveness and asked, “we cannot be friends once we’re enemies . . . can we?”

Code	Code Name	Frenemy Confessional posts (n=100)	Do You Know Confessional Posts (n=100)
1	CP Awareness “CP1”	81%*	60%*
2	CP Secondary “CP2”	71%	66%
3	Sharing, collaborating or competing - others	61%	77%
4	Sharing, collaborating or competing - self	79%	85%
5	Social interactions	1%	0%
6	Human behavior	6%	0%
7	Cognitive Processes - others	10%	18%
8	Cognitive Processes – self	22%	15%
9	Game or exhibit focus	95%	100%
10	Physical human traits	1%	1%
11	Physical world	0%	3%
12	Other content	3%	3%
15	Scale up re: resource sharing – self	0%	0%
15.1	Scale up re: collaboration, competition - self	8%	0%
15.2	Stereotyping - self	0%	0%
16	Scale up re: wide-scale impact of local behaviors or issues	0%	0%
16.1	Scale up: acknowledge wide scale issues of competition for resources	4%	0%
17	Scale up re: resource sharing – others	2%	0%
17.1	Scale up re: collaboration, competition – others	6%	1%
17.2	Scale up: Stereotyping - others	0%	0%
18	Scale up: Social interactions	0%	0%
19	Other types of scaling up and observations	0%	0%
20	Scale up to physical phenomena outside of the museum	0%	1%
21 & 22	Other scaling up	2%	0%

*All percentages shown are based on 100 confessional posts with the exception of CP1 and CP2, which are based on the number of confessors represented by these posts.

For a detailed description of codes and coding please see Appendix C.



Most confessions were about competing or collaborating in the game

Frenemy and Do You Know players posted accounts of their own actions and deliberations in the games themselves, often describing their strategies. Confessors also shared emotional reactions to the games and/or the play.

- *I enemied for the first time today because I was enemied after having been friended for the first several rounds. I still feel a little bit guilty, but not guilty enough that I would change it if I had the power.*
- *My strategy is not to make friends but rather to get the greatest number of points possible. If this means I need to be an enemy, so be it. This is just a game after all. Knowing more about my opponent doesn't really change this feeling (although it may make me a LITTLE less cut-throat).*
- *I'm holding firm to NEVER call the sonogram, "girl" that is just rude. If there is an unidentified female, you call her "Jane". As in "Jane Doe", or "John Doe".*
- *Yes! Team Joy completed! Sorry, I was typing joy, no caps. So the slowdown in the first challenge was all on me. So glad to have completed all the challenges.*

Postings about others' play gave participants a chance to complain about them as well as muse about their motivations. Some people also used confessionals to express joy at winning and/or congratulate their anonymous teammates.

- *No one to play with 2 days in a row! :-\ come on, don't sign up if you're just gonna ignore the game!*
- *Yay someone who finally plays back!*
- *You bastard . . . you did it again. Stop it with the enemy already, it's getting old.*
- *I can't tell if we're all who's on first with our 10th round or if someone's being mischievous.*
- *Good job, late night team girl! Thanks for a good game.*

In both groups, most confessional posts that addressed competition or collaboration within the game included consideration of the author's activities or motivations, and those of others—often with somewhat lengthy commentary about the goals of the games, how to play them, and what constitutes winning. Some posts were an attempt to communicate with other players, either by referencing other confessions by number, or by referencing a Do You Know team, e.g., "Team Amy," based on the name-the-baby challenge in Do You Know.

- *It didn't even occur to me to do anything other than win on points, which meant being enemy" every time. I did not connect the vocabulary of "friend" and "enemy" to actual emotions of friendliness and animosity, but rather to a kind of abstract binary puzzle that was ridiculously simple. ... It wasn't until I read other people's confessions that I realized that some people were reading this very differently . . . are they being benevolent or nasty. It didn't even occur to me to attach those feelings to this very abstract experiment. I guess I was also lucky in the consistency of my other, but I am still mystified about what we or the researchers will learn.*
- *This is in reply to confession #668: THANK YOU for bringing up the river thing, which drives me nuts. I feel like I'm the only one with survival training to know that you should always stay at your camp. You also make another good point about reaching consensus: I find that the majority of the time, I am going along" with what the other person wants. I don't know if I've just had particularly stubborn teammates or what but the few times I've tried to resist immediately correcting my answer to match theirs, are the few times I've had to repeat a trial 3-7 times or more. I'm starting to think that "coordinate" or "knowing what the other thinks" means "just going along to keep the peace".*



A few confessions scaled up to the world outside of the game

Eleven confessional posts in some way reached outside the game. The scaled-up content is usually brief, including several confessions in which the authors make statements about the type of person they are, “I’m a nice person,” or how they like to operate, “I prefer to cooperate,” regardless of the game itself.

- *I prefer to try being friendly, because it works out best for both of us. I prefer to cooperate than to compete. So far, everyone has been friendly. I won't think twice about being an enemy if someone else starts it.*
- *... So, hey scientists: here's your data: I'm a nice person and I don't see the point in being needlessly competitive! Even though I've been in a bad place all week because bad things have happened in my life, that hasn't made me want to be anyone's enemy! And maybe all my opponents are the same or maybe they just didn't have time to jerk out before the rounds ended.*
- *It doesn't bother me at all if someone picks enemy or friend. I just want to win the round. Not for any other reason than I like to try and outsmart people.*

In response to seeing how other people reacted to the game, two Frenemy players made brief, but global statements about human nature. One person “was starting to feel pretty good about the human race” until getting enemied, which left him feeling angry. This person was also unhappy that people seem to enjoy “winning” a completely meaningless game.” Another angry Frenemy player posed philosophical questions at his/her opponents, “are you winning in life?” and wished for a way to talk with opponents before playing. One Do You Know player similarly pushed his/her fellow players to behave more collaboratively.

- *What I'm learning about this game is that people are just a\$\$holes. They are mean. I'm friending you and you friend me . . . why not keep it going? You keep me as your enemy even after you clearly see that I'm trying to be friends?? What I'm trying to tell you is that you should not be selfish and friend me next time so we both win. But no, you decide to make me your enemy until the game ends. Why? What have you gained besides more points? Is the objective for you to win at this or to feel good about humanity? You may win at this game, and you clearly beat me, but are you winning in life? Are you winning inside your heart? Do you have compassion for others? Can't we all just be friends? Oh if I could only chat with my opponent while playing. . . .*
- *This is in reply to confession #620: Meaning you don't want to give up your ideals to go with the group? Are there situations where the consequences / benefits of going with the group might be worth getting your feet wet? What if your life depended on choosing the same as me? Would you still want to assert your individuality? Do you feel principled about your preference for green? (Or 'tails' or 'poodle'?). The game is to figure out what I might do. Creativity has its place, but is it here?*

Two Frenemy confession writers considered their own behavior in relation to the wider world. One person noted that winning was satisfying, but when doing so at the expense of others “across the board the world seems a tougher place.” The other person hoped to use the experience of playing this Experiment month to “reinforce my efforts in the real world to do the nice thing vs. the expedient or vengeful thing.”

- *I love the confessions page. It /is/ a game, but the game leaves you in a state of mind one way or the other. I'm curious if there is a correlation between basic happiness & friending? When I focus on 'getting mine' & winning at the expense of others, this give me the 'hit' I get from winning, but across the board, the world seems a tougher place. . . . What if loosing points STILL means I win? What if it weren't POINTS at stake, but something else? Someone mentioned a 'leaderboard' -- I wonder if I might find myself being MORE competitive if I could see how many points the 'leaders' had? Or see winning strategies?*
- *I decided to see if over an entire month of games if I could stick with the “high road” and always choose Friend. I have only been mildly tempted to choose enemy a few times. I am hoping to use this to reinforce my efforts in the real world to do the nice thing vs. the expedient or vengeful thing.”*



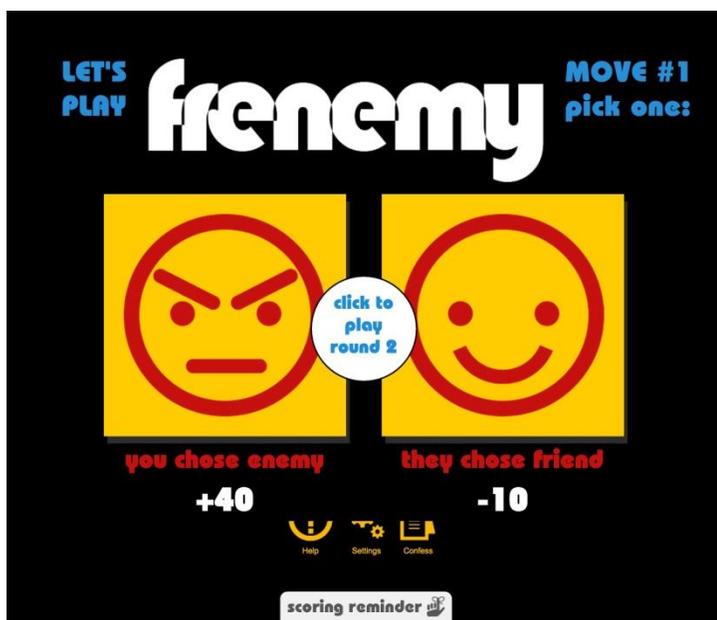
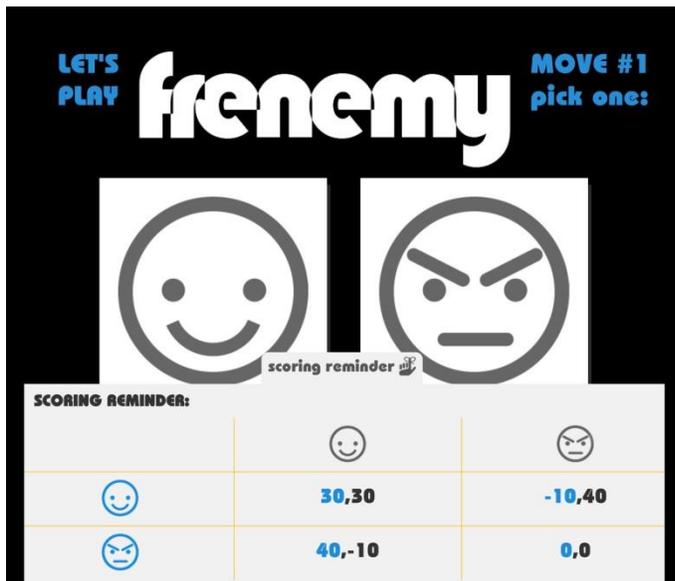
Personal memories of interpersonal interactions came to mind for two confession writers. One person commented that the game was bringing up his/her issues with forgiveness and then thought beyond the game, wondering, “we cannot be friends once we’re enemies . . . can we?” In a similar manner, one Frenemy player thought the game felt “like this is a bad high school relationship. You fake smile and don't strike until you are sure they are contemplating an attack, and then attack first.”

- *Earlier this week my opponent chose enemy on the first round! Then they decided to choose friend, but of course I had switched to choosing enemy. It's kind of bugging me out because I don't understand what they were going for. It's bringing up my issues with forgiveness. No. No, we cannot be friends once we're enemies . . . can we?*

Appendix A: Science of Sharing Experiment Descriptions (provided by MLS staff)

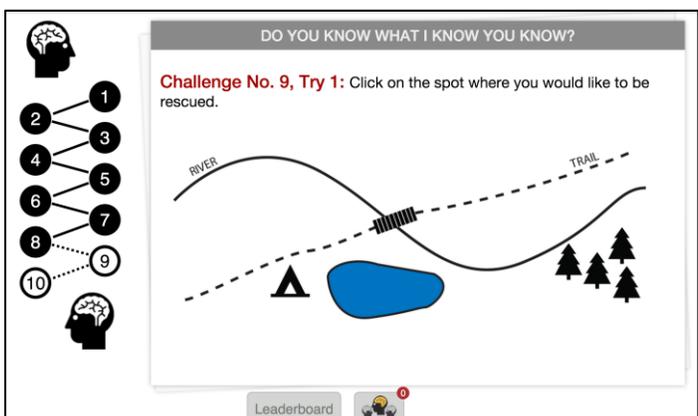
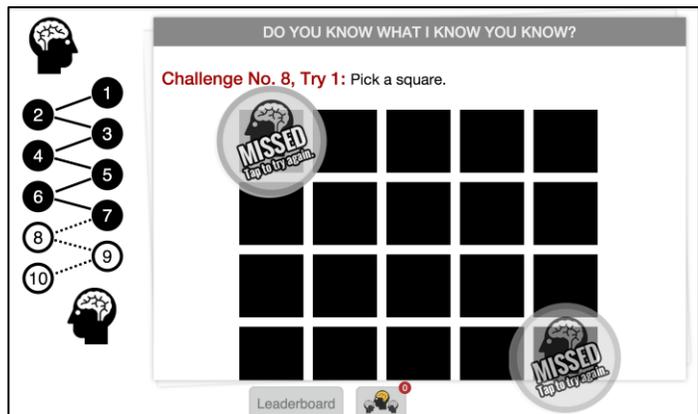
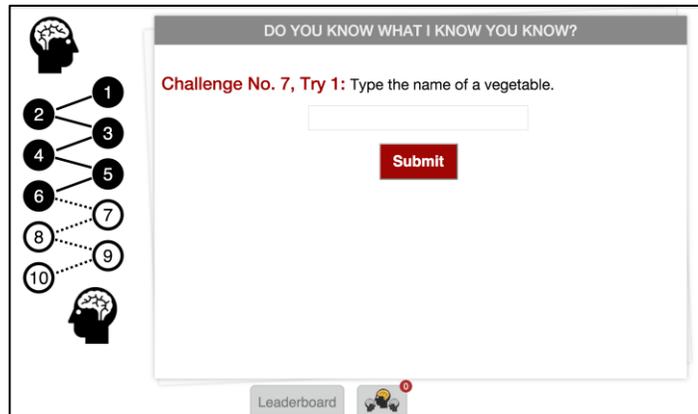
Frenemy

Frenemy (February 2014) paired each player with a stranger every morning for one month (a different one each day). Equipped with only one piece of information about each other and no way to communicate with each other, players decided whether to be friends or enemies, but at a price (friend/friend = 15 points each, friend/enemy = -5 to “friender,” +25 to “enemyer,” enemy/enemy = 5, 5). To social psychologists and neuroscientists like Wouter van den Bos, who helped develop the game, this scenario is called the Prisoner's Dilemma.



Do You Know What I know You Know”

Do You Know What I Know You Know? (April 2014) paired each player with a stranger or two strangers (a different one each day) and asked a series of opinion-based questions. Without the ability to communicate with one another, the players needed to come to a consensus around an answer before proceeding. To game theorists and social psychologists like Lee Cronk <<http://science.experiment.com/%E2%80%9Chttp://evolution.rutgers.edu/people/ches-faculty-mainmenu-150/lee-cronk%E2%80%9D>>, who helped develop the game, this is known as the Focal or Schelling Point <[http://en.wikipedia.org/wiki/Focal_point_\(game_theory\)](http://en.wikipedia.org/wiki/Focal_point_(game_theory))>.



Appendix B: Science of Sharing Exhibit Descriptions (provided by SoS PI)

Science of Sharing: Exhibits and Activities Fostering Investigation of Cooperation, Competition, and Social Interdependence

The Exploratorium’s Science of Sharing project (SOS) was designed to create and evaluate an integrated collection of museum exhibits and activities bringing the scientific study of human social behavior to a broad audience. Funded by the National Science Foundation and grounded in research in social psychology, economics, and game theory, SOS exhibits give museum visitors opportunities to experiment with cooperation, trust, negotiation, and concepts like risk and fairness. But fostering inquiry into such phenomena not only enhances public understanding of the cognitive sciences, it is of fundamental importance in meeting the challenges of the modern world. These experiences are designed to facilitate discussion of links between everyday social interactions and societal issues of resource depletion and group conflict, such as energy crises, arms races, ecosystem collapse, and climate change. The collection marks a major milestone in the way institutions of informal learning create experiences in the scientific study of social behavior and cognition.

Be Kind, Rewind asks visitors to decide whether to exert effort to "rewind" a just-watched video for later visitors. The experience prompts reflection on how we make decisions about helping others in many social contexts. (A kiosk-mounted display screen and electronics.)



Career Criminal, visitors experiment with a classic version of the Prisoner's Dilemma, a two-person game that has been a cornerstone of research on trust, communication, and risk for decades. (A room containing two player stations separated by a barrier of "smart glass," which responds to player input by changing from opaque to clear.)



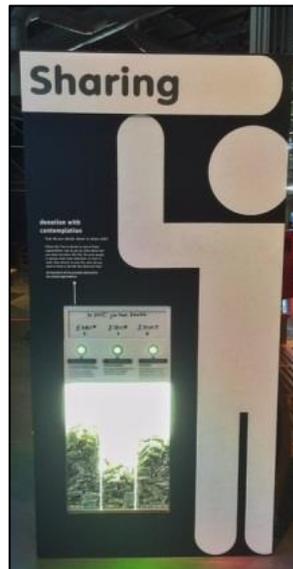
Collaborative Shapes is a simple game at which visitors work together to create a shared 3D design—with their eyes closed. (A nylon rope attached to a wall-mounted eyelet.)



At **Common Knowledge**, visitors try to give the same answers to a range of questions without communicating, illustrating the economic concept of Schelling points—situations in which members of a community share knowledge about preferences and expectations. (A two-player table with a “smart glass” barrier and flipbooks with touch-sensitive pages.)



Designed to prompt discussion of concepts like need and fairness, **Donation with Contemplation** is a simple donation box with a twist: There are 3 charitable institutions to which visitors can donate, each of a different type—for example, an environmental institution, an arts collective, and an animal welfare organization. (A Plexiglas box with three separate locked compartments.)



Explorations of Social Behavior is a set of video screens displaying films illustrating research on impression formation, social norms, helping, cooperation, and other key topics in the behavioral sciences, as well as other depictions of social interaction in humans and nonhumans. (Three video monitors driven by dedicated media players.)



Freeloader is inspired by research on the Volunteer's Dilemma, a social situation in which people must decide whether to accept a smaller reward in order to ensure that all participants receive something. Here, 2-6 players choose whether to try for more points for themselves or accept fewer points to keep the game going for the whole group. (A large kiosk with button stations for six players, display screen, and electronics.)



The **Give and Take Table** is a visitor managed "commons" composed of items they themselves provide. Each day, the exhibit is seeded with an inexpensive item, and visitors are prompted to take the item if they wish but asked to replace it with something of equal or greater value. The exhibit therefore reflects the collective social choices made by dozens or hundreds of guests. (A steel bowl mounted on a platform with embedded graphic panels.)



At **Helping and Wealth**, a set of graphic panels displays methods of studying helping behavior around the world and research on perceptions of wealth distribution. (Graphic panels.)



Making Meaning asks visitors to reflect on their interpretations of concepts such as trust, fairness, and cooperation, and then to discuss how their responses differ from those of their partners. (A table with embedded graphics and specially designed card sets.)



At **Public/Private**, visitors make judgments about private property and social obligations, then compare and discuss their decisions with others. (A table with embedded graphics and specially designed card sets.)



Red/Blue, a multiplayer game at which visitors press buttons to score points for ad hoc teams, demonstrates the ease with which random social associations can lead to intense competition and shifting social alliances. (Four button podiums and two large display screens.)



Sort and Switch is based on research on implicit (or unconscious) associations between social categories and traits or behaviors. Although we all have such associations, the degree to which they influence our behavior depends on motivations and beliefs about fairness and equity. At this exhibit, visitors reveal and discuss their own associations between gender and cooperative behavior. (A table with embedded graphics and specially designed card sets.)



Team Snake is a new take on a classic video game. Here, each player can only move the virtual snake in one direction, requiring visitors to work together to keep the creature alive and growing. (Five button boxes and a large computer-driven display screen.)



TextFish is a simulation of an ocean ecosystem in which visitors must coordinate their fishing behavior to sustain a virtual fish population. The experience provides a visceral illustration of the Tragedy of the Commons—and unlike in the real world, a chance to rethink social strategies after an environmental catastrophe. (Display screens responding to text messages sent from visitors' cell phones.)



Trading Places is based on the Implicit Associations Test, a tool designed by social psychologists to reveal implicit (or unconscious) links between ideas or concepts. In psychology laboratories, it can be used to demonstrate that most people have strong associations between social categories and certain traits, even if they strive to be egalitarian. Here, users sort cards into piles based on gender categories, and usually find it more difficult to quickly place cards into categories that conflict with traditional gender stereotypes.



Trust Fountain is a two-person drinking fountain inspired by the Prisoner's Dilemma. At this exhibit, each player decides whether to give a partner a sip of water or a playful squirt. What each receives depends on how both choose. (A kiosk containing two sinks with nozzles driven by Arduino-based electronics and drawing from an internal reservoir.)



Who Do You Think I Am? asks visitors to respond to a range of questions about images of strangers, prompting reflection on their own stereotypical associations involving race, gender, and age. (Graphic panels with embedded rotating graphic panels.)



Appendix C: Study Details & Protocols

Experimonths Evaluation Plan

Goals of the summative evaluation:

- evaluate the degree to which Experimonths engage participants in short-term (month-long) and longer-term (6 months later) behaviors regarding resource use and sharing
- assess the success of the experience in fostering metacognition and helping participants make conceptual connections to real-world issues of cooperation and resource sharing

Follow-up Phone Interviews

VSS conducted follow-up phone interviews with participants from two different Experimonths at the end of the program month and again six months later. Study volunteers responded to an email invitation sent by MLS which linked them to a SurveyMonkey instrument where they found detailed information, and could give consent and provide contact information. A random sample of those volunteers was selected for the study.

Of the Frenemy players who volunteered for the telephone study, we randomly selected 30, hoping to connect with 20 within two weeks of closing the game and again six months later. Twenty people participated in the first interview; 16 in the follow-up interview. Do You Know had many fewer participants, several of whom had already fallen into the Frenemy sample. Ultimately, 10 participated in the first phone interview and six in the second. MLS produced two other Experimonths during the grant period which were not subjected to summative evaluation: Freeloader and Belonging.

“Confessionals” Data

Comments which participants voluntarily and anonymously posted in the confessionals during the Experimonths were collected and managed by MLS, and shared with VSS. VSS randomly selected 100 posts from each Experimonth for analysis.

Exhibits Evaluation Plan

Goals of the summative evaluation:

- assess the success of the exhibits in fostering metacognition and helping participants make conceptual connections to real-world issues of cooperation and resource sharing
- assess the success of the exhibits in fostering interest in science and/or the social science research associated with the exhibits
- assess patterns of use of different exhibit styles (Card Sorts and Arenas)

SoS Exhibit Impacts – Detailed List

Visitor & Participant Impacts by NSF ISE Category (provided by staff)	Exhibition Comparison Study (exit interviews)	Exhibit Comparison Study (intercept interviews)	Tracking & Timing
Awareness, knowledge or understanding:			
- knowledge of different ways of sharing (cooperation and competition)	x	x	
- awareness of collaborative problem solving	x	x	

Visitor & Participant Impacts by NSF ISE Category (provided by staff)	Exhibition Comparison Study (exit interviews)	Exhibit Comparison Study (intercept interviews)	Tracking & Timing
- understanding of connections between local/individual sharing and global issues of resource allocation (scaling up)	(x)	x	
- awareness that behavioral research explores these issues	(x)	x	
- awareness that SoS exhibits are different from others	x	x	
Engagement or interest:			
- interest in the ideas above that focus on resource sharing	x	x	
- engagement with interpersonal interactions involving sharing and problem solving	x	x	
- interest in factors affecting social interactions	x	x	
- visitors observe and discuss human behavior	x	x	
- impact of floor graphics on Arena-style exhibits	(x)	x	(x)
- patterns of use re: three exhibit styles (cards, intimate, Arena) including dwell time and use/non-use of multiple versions of a single style			x
- visitors interact with strangers while engaging with SoS exhibits	x	x	
Behavior:			
- changes in behaviors relating to resource use and sharing, especially among Experiment participants	(x)	(x)	
- intention to change such behaviors among exhibit users	(x)	(x)	
- intention to take others' perspectives into account in future sharing interactions	(x)	(x)	
Skills:			
- Practicing the skill of metacognition/self-reflection in realizing how one thinks and acts regarding resource sharing	x	x	
- Practicing the skill of mentally modeling the implications of local resource behaviors when they are scaled up to global levels	(x)	(x)	
- practicing skill of taking others' perspectives into account while sharing resources with others	(x)	x	

Interview Studies

Two structured interview-style surveys of SoS exhibit users gathered extensive amounts of data about the SoS experience and impacts on visitors. Exit interviews for the Exhibition Comparison Study, and intercept interviews for the Exhibit Comparison Study (Card Sorts and Arena style) together included 200 interviews of SoS visitors.

Exhibition Comparison Study – Exit Interviews at SoS and Control

To understand how the SoS visit experience might differ from that of more classic Exploratorium physics-based exhibitions, the team selected Light and Color⁹ as the comparison condition. Light and Color, located in the Cross Roads area, is a section within a larger gallery, as is SoS; both spaces have a high ceiling. These exhibition areas also share a similar number of exhibits and enjoy plenty of visitor traffic.

In addition to broad comparison between these exhibitions, the team wanted to know if SoS is used and/or experienced differently under two different conditions: adult-only and all ages conditions. Samples of 100 visitors to each exhibition are evenly divided between adult-only and mixed audiences.

Randomly selected visitors ages 12 and up were invited to participate in a structured interview upon exiting the exhibition areas. To participate, respondents had to have watched or engaged with at least three elements in the exhibition area.

Exhibit Comparison Study Random Sampling	SOS Exhibition	Control (Light & Color Exhibition Area)
Adult only (Thu Nights)	50	50
Visitors (Daytime)	50	50

Exhibit Comparison Study – Intercept Interviews at SoS Card Sorts and Arenas

In addition to learning about the SoS experience overall though data collected for the Exhibition Comparison Study, the team had an interest in different types of exhibits within the SoS collection. Card Sort and Arena style exhibits are somewhat new to the Exploratorium, they have very different characteristics both in production and in the way they are used. Card Sorts are inexpensive to produce and have an intimate feel¹⁰; Arena exhibits are more costly and have a wider reach for multiple players, and are designed to encourage others to observe users, they have a public feel¹¹.

Interviewers observed randomly selected users to ensure engagement of at least one minute with the exhibit prior to intercepting them. Interviewers rotated among the eight different exhibits in the study during data collection shifts.

Exhibit Comparison – Exhibit Types & Sample Structure			
Exh. Type	Characteristics of Exhibit Type	Exhibits	Sample
Card Sorts	<ul style="list-style-type: none"> • Requires interaction of 2-3 people • Uses inexpensive materials • Includes no mechanisms or electronics • Adapts easily to classrooms • Intimate, does not easily allow scrutiny by others 	Making Meaning	12
		Public Private	13
		Sort and Switch	12

⁹ Light and Color, housed in the Bechtel Central Gallery, contains ~20 highly interactive exhibits which visitors can manipulate and experiment with to explore how their vision works and is affected by different conditions.

¹⁰ Two or three people sit at a table with embedded graphics and specially designed card sets. The Card Sorting activities force users to consider and discuss issues around resource sharing, gender-based stereo types, collaboration and competition.

¹¹ Arena exhibits are large scale, games designed for multiple players and to facilitate observation by other visitors. Arena games offer opportunities to compete, collaborate and share with other players.

Exhibit Comparison – Exhibit Types & Sample Structure			
Exh. Type	Characteristics of Exhibit Type	Exhibits	Sample
	<ul style="list-style-type: none"> Seated experience to afford extended conversation 	Trading Places	13
Arenas	<ul style="list-style-type: none"> Allows interactions of 3+ people Exhibit components are at a larger, multi-person scale (e.g., large screens, large footprint) Encourages interactions observable by non-users Allows players to leave without disrupting interaction 	Freeloader	12
		Red/Blue	13
		Team Snake	12
		TextFish	13

Tracking & Timing Study

Data for a tracking and timing study of the SoS exhibition were collected from overhead video recordings of people in the space. Exploratorium VRE staff managed the ceiling cameras. A research assistant experienced with video data used the Exploratorium computer systems to collect tracking and timing data on randomly selected visitors in the videos.

The tracking and timing study aimed to answer two main questions. In addition to generally understanding how the exhibit is used, the team wanted to know if the exhibition is used differently in the presence and absence of children. To make that comparison, data were collected during daytime for an all-ages audience, and during evenings for an adult-only audience as described in the following table.

Research Question	Study Design	Sample Size	Sub-questions
1. How are visitors using the SOS exhibition?	<ul style="list-style-type: none"> representative data to understand generally how the exhibition is used by adults and teens Collect 3:1; six daytimes and two evening evenings for a total of eight recording sessions 25 cases from each of those eight recording sessions 	150 daytime 50 evening Total: 200	<ul style="list-style-type: none"> Total dwell time Number of exhibits used Most-used exhibits Holding time at individual exhibits and exhibit types (Card Sorts and Arenas) Patterns of observing before using exhibit types Sequence of use, i.e., use more than one of the same type
2. Do visitors use the SOS exhibition differently when children are present/absent?	<ul style="list-style-type: none"> equal numbers of participants in the two conditions two daytime and two evening recording sessions 25 cases from each recording session 	50 daytime 50 evening Total: 100	

Capturing Visitors on Video

Three cameras in the ceiling were trained on the exhibition area such that we could see all of it. The main camera was pointed straight down in the center, two other cameras were at angles to observe areas beyond the scope of the center camera. In compliance with IRB regulations, Museum staff slightly blurred the images such that individuals were not recognizable, and posted signs during video recording times alerting visitors that they were entering an area where video recording was taking place.

Data Collection

With training and technical support from Exploratorium VRE staff, we collected data on randomly selected visitors in the video recordings: what they attended to, did they observe and/or engage, and for how long. To be included in the sample, subjects had to appear to be at least 12 years old, and remain in the space for at least one minute, or if on camera for less than one minute, engage with at least one element before leaving. Many people walk directly and quickly through the space on their way to other places; they were not included in the sample. To catch repeat visits to the SoS exhibition area by subjects in the sample, video records were visually examined for ten minutes after the apparent exit. For those few people who did return within a ten-minute window, dwell time and other data collection continued cumulatively.

IRB Oversight

All study protocols were reviewed and approved by Ethical and Independent Review Services.
Study numbers: 13102 – 01 and 13102-02.

Coding & Analysis

Metacognition

Metacognition - Definition

The concept of metacognition is key to SoS goals and evaluation findings. The following definition appears in the SoS Verbal Metacognition Coding Scheme (v.47, 12/15/14) created by in-house SoS team members:

METACOGNITION (MC) is defined broadly as knowledge, awareness or monitoring of one's own or others' cognitive processing. Cognition is defined as a broad (almost unspecifically so) term, which has been traditionally used to refer to such activities as thinking, conceiving, reasoning, etc. Most psychologists have used it to refer to any class of mental 'behaviors' (using that term very loosely) where the underlying characteristics are of an abstract nature and involve symbolizing, insight, expectancy, complex rule use, imagery, belief, intentionality, problem-solving, and so forth." (Dictionary of Psychology, 1995)

Metacognition Codes: CP1 and CP2

The summative evaluation coding scheme uses the two codes for metacognition developed by the Exploratorium SoS research team. The following descriptions are adapted from their SoS Verbal Metacognition Coding Scheme (v.47, 12/15/14). Please see that document for more detail.

1. Cognitive Process Aware (CP1): Simple evidence of awareness of one's own or someone else's primary cognitive process. Example: "I think it was the third time."
2. Cognitive Process Secondary (CP2): A statement that meets the definition of CP1, and for which the subject of the metacognition is itself cognitive in nature. Example: "I think you would pick the bridge."

Assessing metacognition in the interview context

The in-house research team worked with audio-video data in which pairs of visitors used the exhibits and interacted with each other in real time, they were not being interviewed. Relying on interviews for the summative evaluation studies presented a special challenge for assessing metacognition. Posing questions to respondents can easily cause them to metacognate, but we wanted to learn if the exhibits had made them do so, and what type of thinking was elicited. To those ends, interview protocols included follow-up questions and probes to confirm that experiences being reported were "at the time" of exhibit use. Special attention was given to this point during coding as well.



At the time of exhibit use

To verify that the thoughts, ideas, and feelings, which people described during their interviews were things which they had experienced at the time of using the exhibit or the Experiment, not as a result of our questions, we followed up participant responses with, “was that a thought you had at the time, or now that I’m asking you about it?” Most respondents could clearly distinguish and explain when they had been experiencing their thoughts and feelings. Quite a few people specified that part of what they had told us was something they had thought about at the time, and part of it was as a result of being asked to think about it again in the course of the interview. Some respondents clearly had the same pattern in their answers, but indicated that their thought was only as a result of being questioned. Responses or partial responses in which respondent language clearly indicated that the s/he had had the thought at the time of experiencing the exhibit(s) were coded as “at the time.”

The examples below present the type of response content, including verb tenses, which qualified for an “at the time” code. The last one demonstrates an apparent shift in thinking on the part of the speaker from “at the time” to “as a result of the question.”

- *The stereotype [exhibit] I thought was interesting. [Can you tell me more about that?] It's like, you do stereotype people and I was aware of how I was thinking about each one and how I was prejudice and stereotyping them.*
- *I was just putting myself in their place and being like, if I was them I wouldn't have done that, I would have done something different, or when it's my turn, I should try that. . . .*
- *It made me think of how, like you'll see in advertisements and stuff or work on a project with someone, you can see their idea in your head, but their idea may not be what you are thinking. [Can you tell me more about that?] [Apparent shift to “as a result of the question”] Each person has their own intentions in life in general. Every person has their own individual ideas, thoughts, strategies - that's what makes this game so hard, because is your intention to help yourself or the chances of the group in the game?*

Responding to questions

When responding to the question, “What did you learn?” many people launched into their response with “that...”, rather than making a complete statement, “I learned that...” In clear cases of this linguistic short cut, we treated the statement as though it were complete, and coded it CP1 or CP2 per the scheme referenced above.

During our conversational interviews, respondents frequently said, “I don’t know...” In cases where it was clear that the respondent was actually considering something that they didn’t know, e.g., “I don’t know why he did that...” the statement was coded CP1 or CP2 as appropriate. In cases such as the two examples below “I don’t know” was not a considered statement of not knowing, but a language crutch. Such statements did not get a CP code.

- *They're very hands-on and interesting to me. [Can you tell me more about that?] I think that, I don't know, like dealt with the games, the games were fun because you got to work with someone else doing it. I don't know, the games were more interesting to me.*
- *Just 'cause there's . . . I don't know . . . it has a really good combination of making you perform an action and learn—you get sort of a reaction from it.*

It’s interesting; it makes sense

Respondents often commented that something was interesting or made sense. These were not given a CP code. When respondents stated that something “made sense to me” or was “interesting to me” a CP1 code was applied. If what was interesting or made sense was cognitive, e.g. “It was interesting to me to see what they would choose” the statement was coded CP2 per the scheme referenced above.

SoS & Control-related Content

SoS project goals and desired visitor impacts encompass several “content areas” germane to resource sharing which developers hoped visitors would notice, ponder, and/or metacognate about. They included sharing, competition, collaboration, human behavior, social interactions, and cognitive processes. Awareness of and attention to stereotyping, including prejudice and gender bias was coded separately, because visitors discussed these things specifically and distinctly. The control exhibition used in the Exhibition Comparison study presents content related to vision and visual perception so we created additional codes to accommodate those themes as well.

Two-tiered Coding

Exit and intercept interviews addressed several areas of inquiry: was the exhibit(ion) engaging and why, did respondents watch others, did they interact with strangers, did they learn something about self/others, had they been aware of their own thinking, and did they relate this content or experience to life outside the museum (scaling up). Using a two-tiered coding system, we could assess each of those areas of inquiry for the presence of metacognition, as well as identify the content being addressed by the respondent. All interview data were co-coded.

Source	Code #	Name	Description & Notes
EXP: SoS Coding Scheme	1	CP Awareness “CP1”	Verbalizations which evidence awareness of one’s own or someone else’s primary cognitive process
	2	CP Secondary “CP2”	Verbalizations which meet the definition of CP1, and for which the subject of the metacognition is itself cognitive in nature
EXP: NSF Impacts Table - Awareness, Knowledge, Understanding Within the game or exhibit (not scaling up)	3	Sharing, collaborating or competing - others	Verbalizations about thoughts or behaviors relating to sharing, collaborating and/or competing on the part of others or people in general, within the context of the game or exhibit
	4	Sharing, collaborating or competing - self	Verbalizations about one’s own thoughts or behaviors relating to sharing, collaborating or competing within the context of the game or exhibit
	5	Social interactions	Verbalizations about social interactions in the context of the game or exhibit
	6	Human behavior	Verbalizations about human behavior in the context of the game or exhibit
	7	Cognitive Processes - others	Verbalizations about the cognitive processes of others or people in general within the context of the game or exhibit
	8	Cognitive Processes – self	Verbalizations about one’s own cognitive processes within the context of the game or exhibit
VSS: Additional content codes to accommodate responses in Control	9	Game or exhibit focus	Verbalizations relating to the game/activity/exhibit itself, e.g., how to use it, if they like it, etc. (Ultimately this was not useful.)
	10	Physical human traits	Verbalizations about physical human traits (not cognitive), e.g. how vision works
	11	Physical world	Verbalizations related to the physical world; physics, e.g., how movies are made
	12	Other content	Verbalizations related to other types of content not included in above codes

Source	Code #	Name	Description & Notes
VSS: Interaction w/ Strangers	13	Non-verbal interactions	Eye contact, glance, laugh, other physical, non-verbal
	14	Verbal interactions and/or engagement	Discuss, collaborate or compete in the game/exhibit
EXP: NSF Impacts Table Skill Practice / Scaling up	15	Scale up re: resource sharing – self	Practicing the skill of metacognition/self-reflection in realizing how one thinks and acts regarding resource sharing
	15.1	Scale up re: collaboration, competition - self	Practicing the skill of metacognition/self-reflection in realizing how one thinks and acts regarding collaborating, competing
	15.2	Stereotyping - self	Verbalizations about one’s own thoughts or behaviors related to gender and other types of stereotyping
	16	Scale up re: wide-scale impact of local behaviors or issues	Practicing the skill of mentally modeling the implications of local resource behaviors when they are scaled up to larger levels
	16.1	Scale up: acknowledge wide scale issues of competition for resources	Refer to resource competition/sharing in the world outside the museum without verbalizing a local connection
	17	Scale up re: resource sharing – others	Practicing the skill of metacognition about how others act regarding resource sharing (sharing, collaborating, competing)
	17.1	Scale up re: collaboration, competition – others	Practicing the skill of metacognition about how others think and acts regarding resource sharing (sharing, collaborating, competing)
	17.2	Scale up: Stereotyping - others	Verbalizations about the thoughts or behaviors of others related to stereotyping, prejudice and/or gender bias
	18	Scale up: Social interactions	Relating exhibit content to social interactions outside of the Museum
VSS: Additional Types of Scaling Up	19	Other types of scaling up and observations	Recoded to refined codes 15-17.1
	20	Scale up to physical phenomena outside of the museum	References to physical phenomena or related experiences outside of the museum that are a part of the “real world”, e.g., going to movies
	21 & 22	Other scaling up	References to personal life or the wider world, which do not fit into refined 15-17

Statistical Analysis

Originally coded in Excel, comparative data were extracted and analyzed using the programming language Python, with data analysis libraries Pandas and SciPy. Statistical comparisons were made using Ordinary Least Squares Regression (OLS). Most variables in this analysis were binary, and could be appropriately treated as either categorical (in which case a Chi-Squared test is used) or continuous (in which case, OLS is used). Chi-squared and OLS use slightly different assumptions about the underlying distributions of the

observations, but differences should be very small, and for the purposes of identifying significant differences, negligible. We also used OLS to compare means for the rating scales (treating the rating scales as interval data, an accepted practice in social science research). For all analysis we treated p-values of .05 and less as significant.

Interview Protocols

Experimonths

Informed Consent – In the SurveyMonkey Instrument

Thank you for your interest in participating in our follow-up telephone interview study. This is a research project intended to help us understand if and how participating in the Experimonth program informs participants. If you choose to participate in this study you may be contacted by phone two times: once within a couple of weeks of agreeing to participate, and once about six months later. We expect these telephone interviews to take about 20 minutes each.

While participation in a study such as this is not expected to benefit you specifically, interview participants often enjoy discussing their thoughts and reflections about the program. We expect your input to benefit the efforts of the Museum of Life & Science in Durham, NC, and the Exploratorium in San Francisco, CA, as they improve and develop new Experimonths. Research on these programs may in turn inform the wider field of informal education and online programs.

Participating in this follow-up phone interview study is voluntary. You will not be paid and you lose nothing by refusing to participate. You have the option of ending the interview when you like and you are free to skip any questions. With your permission, interviews will be audio recorded to facilitate analysis. If you do not want to be recorded you should not take part. You will remain anonymous; your responses will not be associated with your name or any other identifying information at any time during analysis or in any report of study findings.

Volunteer interview study participants are eligible for an Experimonth tee-shirt drawing. Four winners will be chosen at random. If you'd like to be included in the drawing for a chance to win a tee-shirt, please let us know on the information form (see check-boxes below for the link).

Additional information:

Experimonths are a part of the Science of Sharing project funded by the National Science Foundation. The Principal Investigator on this grant-funded project is Hugh E. McDonald, Ph.D. If you want more information about this project, you can contact Dr. McDonald: The Exploratorium, Pier 15, The Embarcadero, San Francisco, CA 94111, 415.528.4817.

The follow-up phone interview study is being conducted by Wendy Meluch, Doing Business As (DBA) Visitor Studies Services. For more information about this study, you may contact Ms. Meluch at wendy@visitorstudies.com, 415.897.4051.

If you have any questions, concerns, complaints or input about this research, and want to talk to an independent third party about it, you may contact Ethical & Independent Review Services at subject@eandireview.com, 800.472.3241 (toll free).

I would like to volunteer to participate in this telephone interview study. By clicking this button I indicate that I have read the information provided above and give consent to participate.

I do not want to participate in this telephone interview study.



First Interview (end of the Experiment)

These conversational-style interviews typically followed this protocol using appropriate probes and follow-up questions. Naturally, the flow varied with different participants.

- Introduction and permission to audio record
- Filter to identify experience designers (people directly involved with SoS would not have been included in the sample)
 - Do you work in experience design? Exhibits, programs, games...
 - What kind of work do you do?
- Discover – Motivation - Expectations
 - How did you learn about ___?
 - First time to play it or an Experiment?
 - Why did you decide to sign up?
 - What did you expect it would be like?
 - If respondent expressed disappointment or frustration: explore what could have helped
- Play and Strategy
 - I see you played XXX weeks.
 - Was it easy to check in and do it each day?
 - Did playing it change in any way for you over time? Your availability, attitude, etc.
 - Did you have a strategy? What was it? How did you arrive at that? Did it change over time? If so, how... why?
 - How did you react to friending/enemying or matching/not matching your partner?
 - Did your reaction surprise you? Could you see that influencing how you played?
 - Did you find yourself wondering about your partners?
- Winning
 - Were you focused on winning points?
 - Did your focus/lack on points surprise you?
 - Did it change over time? Why?
- Confessionals
 - Did you read confessionals?
 - Did that influence how you played or thought about ___?
 - Did you write anything in the confessionals? Did anyone comment to you on them? Did that affect how you played?
- Reflections and Scaling Up
 - Experiment motto: "Know yourself through science." Does this ring true? Do you feel like you learned something about yourself?
 - We talked about your reactions to matching... cooperation / competition...
 - Explore cognition, behaviors, attitudes, etc.
 - Did you learn something about human behavior outside yourself? Explore.
 - Did anything about participating in ___ make you think about life beyond the game? ... Had you had that thought before, or did my question get you thinking along those lines?
 - During play or since it ended, has anything in the world outside of ___ reminded you of it?
- Communicating With Others
 - During the game, or since it ended, have you talked/social media about it?
 - Explore nature of communication and content
- Wrap up
 - Since completing ___, have you given it much thought? ... miss it, relieved it's over...
 - Would you play it again?
 - Is there anything else you'd like to share?
 - Follow-up in 6 months...

Second Telephone Interview (six months after Experiment completion)

- Introduction and permission to audio record
- Explore thoughts and actions since first interview
 - It has been about six months since we first spoke.... As you think about playing ___ back in (month), what comes to mind?
 - Has anything since our first conversation reminded you of ___?
 - Did you go back and read any confessionals or anything else about ___ or other Experiment months since we first spoke?
 - Do you remember talking with anyone about ___ since our first interview?
- Revisit reflections and scaling up
 - When we spoke in (month) I asked you about the Experiment Motto... Do you remember what you told me about? Explore... Has anything else come to mind since our conversation?
 - Review/read comments from first interview to probe and explore related musings since then.
 - Do you feel like participating in ___ in any way affected the way you see yourself, or other people, or the world?
- Is there anything else you'd like to share?

Exhibits

Interview protocols for both interview studies shared many “areas of inquiry” in common. After the initial question for each area of inquiry, follow-up question probed for clarity and confirmed that the thoughts and experiences visitors were describing had taken place during exhibit use, and not as a result of being asked about it in the interview.

Structured Interviews - Areas of Inquiry	Exit Interviews	Intercept Interviews
What was it like to use this exhibit?	n/a	Included
How engaging was this exhibition?	Rating Scale	n/a
Did you learn something about yourself or others?	Included	Included
Were you ever aware of your own thinking?	Included	n/a
Did you watch others?	Included	Included
Did you interact with strangers?	Included	Included
Did using/this exhibit(ion) make you think of life outside the museum? [Scaling up]	Included	Included



Exploratorium SoS & Control Exit Interview

I'll be asking you questions about exhibits in this area only. *[Gesture and describe.]*

1a. Using this scale of 1-5, how engaging would you rate the exhibits in this area?

Rating:

b. Why did you rate them that way? *[Probe to clarify]*

2a. Do you feel like you learned anything about yourself or others while using exhibit(s) in this area?

Yes No

b. What did you learn? *[Explore & clarify; dig into ref. re: content, sharing, competing, cooperating]*

c. Did you think that at the time, or now that I'm asking you about it?

At the time Now

3a. Was there a time while you were using these exhibits when you were aware of your own thinking? Like being aware of what was running through your mind at the time.

Yes No

b. Can you describe that for me? Which exhibit(s)? *[Explore & clarify; dig into ref. re: content, sharing, competing, cooperating]*

c. Did you think that at the time, or now that I'm asking you about it?

At the time Now

4a. Did you ever find yourself watching other people use exhibits in this area?

Yes No

b. Which exhibit(s) did you watch people use?

c. Do you recall what made you pause to watch them?

d. What was running through your mind while you were watching them?

Did you think that at the time, or now that I'm asking you about it?

At the time Now

5a. Did you interact with a stranger at any of the exhibits you used or watched in this area? Your interaction could have been anything talking, using it together, cheering someone on...

b. Which exhibit?

Yes No

c. Can you tell me about that interaction? *[Explore & clarify; dig into ref. re: content, sharing, competing, cooperating]*

d. *[If yes]* Were there any other exhibits where you interacted with a stranger in some way?

6a. The next question uses the same scale of 1-5. Not right now, but thinking back, did using or seeing the exhibits in this area make you think of life outside the museum? *[Clarify if asked]* Such as issues that you or society deals with in daily life?

Rating:

b. What did it make you think of? Which exhibit(s) made you think of that? *[Explore & clarify; dig into ref. re: content, sharing, competing, cooperating]*

c. Did you think that at the time, or now that I'm asking you about it?

At the time Now

d. *[If not mentioned already:]* **How about issues that you or society deals with in daily life?**
[Explore & clarify; dig into ref. re: content, sharing, competing, cooperating]

e. Did you think that at the time, or now that I'm asking you about it?

At the time Now

7. I have a few questions about you so we can understand who is in our sample.

a. How many people are in your group today, including yourself? _____

Please tell me the letter and number that apply to you:

b. Age? _____ *(letter)*

c. Level of education completed so far? _____ *(number)*

d. *[Note presented gender]* _____

Thank you!
**[Offer Gift
& Sticker]**

Date:	Time:	Location:	Initials:	Case #:
Exploratorium SoS & Control Intercept Interview				



Card Sorts	1. ____ Trading Places	Arenas	5. ____ Team Snake	Station:	L	D	U	R	
	2. ____ Sort and Switch		6. ____ Red Blue						
	3. ____ Public Private		7. ____ Textfish	Station:	1	2	3	4	(single or red user)
	4. ____ Making Meaning		8. ____ Freeloader						

1. As I mentioned, we're talking to people who use this exhibit. Can you tell me what it was like for you to use it? *[probe to clarify]*

2a. Did you also watch other people using it?

Yes	No
-----	----

b. Do you recall what made you pause to watch them?

c. What was running through your mind while you were watching them?

d. Did you think that at the time, or now that I'm asking you about it?

At the time	Now
-------------	-----

3a. Using this scale of 1-5 please rate to what extent you feel like you learned something about yourself or others at this exhibit.

Rating:

b. *[If rated 3 or higher]* What did you learn?

[Probe & clarify. If they reference content such as sharing resources, competing, cooperating, dig in!]

c. Did you think that at the time, or now that I'm asking you about it?

At the time	Now
-------------	-----

4a. You described learning about [yourself / others].
Do you feel like you learned something about [others / yourself] ?

Yes	No
-----	----

b. *[If yes]* What did you learn?

[Probe & clarify. If they reference content such as sharing resources, competing, cooperating, dig in!]

c. Did you think that at the time, or now that I'm asking you about it?

At the time	Now
-------------	-----

5a. While you were watching or using this exhibit, did you interact with a stranger?
It could be anything, talking, using it together, cheering someone on...

Yes	No
-----	----

b. *[If yes]* Can you tell me about that? *[If they reference content such as sharing resources, competing, cooperating, dig in!]*

6a. The next question uses the same scale of 1-5.
Not right now, but thinking back, did using or seeing other people use this exhibit make you think of life outside the museum?
[Clarify if asked] Like, issues that you or society deals with in daily life?

Rating:

[If they reference content such as sharing resources, competing, cooperating, dig in!]

b. What did it make you think of? Which exhibit(s) made you think of that?

c. Were you thinking that at the time, or now that I'm asking you about it?

At the time	Now
-------------	-----

d. *[If not mentioned already]* How about issues that you or society deals with in daily life? *[If they reference content such as sharing resources, competing, cooperating, dig in!]*

e. Were you thinking that at the time, or now that I'm asking you about it?

At the time	Now
-------------	-----

7. I have a few questions about you so we can understand who is in our sample:

a. How many people are in your group today, including yourself? _____

Please tell me the letter and number that apply to you:

b. Age? _____ *(letter)*

c. Level of education completed so far? _____ *(number)*

d. *[Note presented gender]* _____

Thank you!
[Offer Gift & Sticker]