

Original Paper

Infant Social Evaluations in Response to Unequal Resource Distribution

Evan M. Jordan^{1*}, David G. Thomas¹ & Elisabeth Ponce-Garcia²

¹ Psychology, Oklahoma State University, Stillwater, USA

² Psychology, Southeastern Oklahoma State University, Durant, USA

* Evan M. Jordan, Psychology, Oklahoma State University, Stillwater, USA

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Abstract

Healthy emotional development provides a foundation for the development of prosocial motives and their subsequent behaviors, especially those emotions specifically related to empathic responding. Previous research has demonstrated a preference for individuals who behave prosocially, as opposed to antisocially, in infants as young as 3 months of age (Hamlin et al., 2010). It has also been suggested that by 18 months of age infants may be evaluating the equitable and inequitable distributive actions of others as being either prosocial or antisocial behaviors, respectively (Geraci & Surian, 2011). This previous work has focused exclusively on the agents of the distributive actions. The purpose of the current study is to focus on the recipients of those actions, i.e., to determine if infants engage in social evaluations directed toward the individuals who are on the receiving end of prosocial and antisocial distributive behaviors. Specifically, this study assesses infant responses toward receivers that have been treated antisocially to determine if infants are displaying an empathically charged response toward individuals affected by antisocial actions.

Keywords

infant, development, resource distribution, inequity aversion, social evaluation

1. Introduction

Throughout development, infants and young children will encounter many situations that will require them to engage in social evaluation and reasoning, some of it complex. A problem that will arise in these developmental periods concerns the fairness of the distribution of resources. Humans, as an ultra-social species, must remain in compliance with social norms to maintain a functioning human society. Adult humans, as well as other social species such as non-human primates and even dogs, have

been found to display negative responses to the unequal distribution of resources, specifically when the distribution represents reward allocation (Brosnan, Schiff, & Frans, 2005; Fehr & Rockenback, 2003). In humans, this understanding of equitable resource distribution has been found to begin in late infancy and strengthen throughout development (Geraci & Surian 2011; Ziv & Sommerville, 2018).

Previous studies have reported evidence of infants under the age of 2 years forming egalitarian expectations regarding the distribution of resources, demonstrating a more positive evaluation of egalitarian distributors compared to non-egalitarian distributors. For example, Geraci and Surian (2011) showed 12- and 18-month-old infants a series of trials on a computer screen in which a colorful cartoon distributor allocated resources to two receivers, with either equal or unequal distributions. In the former scenario, the distributor evenly dispersed colorful discs to two receiving agents. The latter scenario resulted in the uneven dispersal of discs by the distributor to the two receiving agents, providing one receiver with two colorful discs and the other receiver with none. The infants were then shown the two distributors. There was no significant difference in how often the younger infants looked at the fair and unfair distributors. However, the older infants looked significantly longer at the fair distributor, which was assumed to demonstrate infant preference for that distributor. This would indicate that infants appear to be able to evaluate the fairness of the behavior of others, though this ability is dependent on the age of the participant.

Research supporting the findings of Geraci and Surian (2011) that infants in their second year can indeed make such evaluations was carried out by Schmidt and Sommerville (2011). They found that 15-month-old infants looked longer at the outcome of an event depicting a distribution of unequal resources compared to when the infants observed an event in which resources were distributed equally across agents. This longer looking presumably indicated that the infants' expectations of the event outcome had been violated by the distribution of unequal resources. While these looking behaviors may seem to conflict with the study by Geraci and Surian that measured infant preferences by longer looking times, it should be noted that in preference paradigms, looking time at the *distributor* is being assessed. On the other hand, in violation of expectation paradigms (e.g., Schmidt & Sommerville), looking time at the *event outcome* is measured. Therefore, Geraci and Surian found 18-month-olds to look longer—i.e., prefer—distributors who distribute equal amounts, while Schmidt and Sommerville found 15-month-olds to look longer at events showing unequal distribution, presumably because such events violated the infants' expectations of equal distribution. These outcomes suggest older infants *expect* equal distribution of resources and *prefer* distributors who do so.

Importantly, Schmidt and Sommerville (2011) also found that the previous emergence of spontaneous sharing behaviors with caregivers and peers was necessary to consistently elicit a violation of expectation of equal distribution in the infants. More specifically, infants that had already demonstrated sharing behaviors in a naturalistic setting looked longer at the unfair distributive outcome than infants

that had not yet demonstrated sharing behaviors. According to Ziv and Sommerville (2018), infants' understanding of fairness is related to their ability to perform sharing actions, which may influence how infants perceive distributive actions and allow for the development of an expectation of fairness.

Additional work by Meristo and Surian (2013) has provided evidence that 10-month-old infants are capable of making social evaluations of fairness based on previous behaviors by the receiving individuals. Meristo and Surian (2013) used a paradigm in which two distributing agents treated two identical receivers either fairly, by distributing two strawberries equally across the two receivers, or unfairly, by distributing both strawberries to one receiver and ignoring the remaining receiver. Following this phase, a new agent entered and distributed strawberries to either the unfair or fair distributor. Longer looking time in this study was assumed to indicate that the infants' expectations of the event outcome had been violated. Infant looking times were significantly longer when the new agent distributed strawberries to the agent that had previously distributed an unequal number of strawberries compared to looking times when the new agent distributed these resources to the agent that had distributed the resources equally between receivers. Thus, these 10-month-old infants were considered to be positively evaluating the fair, equal distributor rather than the unfair, unequal distributor and were surprised when the distribution of resources by the new agent favored the latter. Similar findings were reported by Surian and Franchin (2017) in their violation of expectation paradigm. This study, conducted with 15- and 20-month-old infants, found that by 20 months of age infants preferred to see agents of equal merit receive equal distributions and children and agents of unequal merit to receive distributions proportional to their relative merit. The 15-month-old infants demonstrated a similar pattern of behavior, but the results were not statistically significant. However, this indicates that by later in the second year of life infants may be taking merit and deservingness, rather than just surface level equity, into account when making evaluations of fairness and instead deservingness may trump egalitarian principles in infants' reasoning.

To reiterate, in preference paradigms, looking time at the agent(s) is being evaluated, but in violation of expectation paradigms, looking time at the event outcome is evaluated. That said, contrasting results investigating the socio-moral competence of infants have been found across several studies following the violation of expectation paradigm. For example, longer looking times were recorded in a study by Sloane, Baillargeon, and Premack (2012) demonstrating events of unequal resource distribution, and when unfair agents received rewards rather than fair agents (Meristo & Surian, 2013). While there may be plausible explanations for these differences, the interpretation of longer looking times in more than one way within either the preference paradigms or the violation of expectation paradigms would lead to non-falsifiable hypotheses and therefore, non-scientific measures of preference or aversion.

Overall, infants have been observed displaying differential responding toward equitable and inequitable resource distribution paradigms. While various measures have been used in these paradigms, each has

attempted to demonstrate that infants recognize differences in equitable and inequitable resource distribution and each has attempted to demonstrate that infants have an aversion toward inequitable distribution or a preference for equitable distribution. While it can be theorized that infants are making these complex social evaluations based on learned reactions from social interactions, namely cognitive and/or affective components of empathy, a greater understanding of infant responding in these paradigms is required to more fully understand why infants are indicating a preference for equitable distribution and an aversion toward inequitable distribution.

As the above review demonstrates, research observing the development of inequity aversion and preference for resource equality has been conducted across a variety of age groups (Hamlin & Wynn, 2011; Hamlin et al., 2011; Geraci & Surian, 2011). However, to our knowledge, all of the previous research has focused on the responses of infants and toddlers toward the agent actively distributing in an equitable or inequitable manner. While this research provides an understanding of early moral and social development and its effects on preference for equal resource distribution, little is known about infant evaluations of individuals on the *receiving* end of inequitable resource distribution.

Additionally, few studies observing reactions to distributive behaviors have included non-social entities as either active or passive agents to allow for a behavioral comparison of infant responding to inequitable resource distribution directed toward inanimate, non-social (lacking facial features) agents. By comparing behavioral differences that occur toward both social and non-social entities, we can gain a clearer understanding of the factors that influence infant preferences for one agent over another.

The purpose of the current study was to determine if infants in their second year of life prefer individuals who *receive*, rather than *give*, a greater number of resources in an inequitable distribution trial, or individuals that have received fewer resources. A preference for the receiver of more resources would suggest that infants value prosperity. However, a preference for the receiver of few or no resources would suggest a potential empathic emotional response to individuals that are victims of unequal resource distribution. This purpose was addressed through the behavioral observation of infants that were exposed to a paradigm of resource distribution, consisting of unequal distribution trials that used both animate and inanimate receivers. The aforementioned literature can be interpreted to mean that infants have the capacity for compassion. Thus, we hypothesized that infants would demonstrate a greater preference for receiving agents that are provided with fewer resources compared to the alternate receiver due to an affective empathic response by the infant observer. Furthermore, we hypothesized that when the receiving agents were inanimate the infant would show a greater preference for the receiving object to which was distributed a greater number of resources, thereby indicating that infants may be aligning with greater resource amounts when empathy is seemingly removed from the situation.

2. Method

2.1 Participants

Twenty-seven full-term, healthy infants (9 males; 18 females) accompanied by their mothers were assessed between the ages of 16 and 20 months ($M = 79.68$ weeks, $SD = 4.96$). Maternal ages ranged between 24 and 48 years ($M = 34.35$), with the majority of mothers being Caucasian (80%), married (68%), and college educated (84%). One female infant did not complete all six trials and the procedure was aborted at the request of the caregiver due to excessive distress, and one female infant's responses were unable to be coded due to equipment malfunction. Therefore a final sample of 25 infants was analyzed.

2.2 Materials and Procedures

2.2.1 Demographic Questionnaire

Primary caregivers were administered a demographic questionnaire to collect general information regarding the infants and the members of their immediate families. Information on income level, marital status, number of siblings, birth order, household language, and parental education level was gathered.

2.2.2 Distribution Display

The distribution paradigm occurred in a custom wooden display (48" L X 34" H X 22" D) that emulated a "black box theatre". Two receiving agents were placed on either side of the stage. The resources, which were brightly colored wooden rings approximately three inches in diameter, could be placed during the test phase of the procedure on a stationary wooden peg situated in front of each of the receiving agents. A cut-out in the rear wall of the display allowed for the distributing agent to enter and distribute the resources to the receivers on either side of the stage.

2.2.3 Agents

Animate distributing and receiving agents consisted of seven different plush stuffed animals of various colors. The inanimate receiving agents consisted of six plush geometric shapes (7 x 7 in) of various colors. An animate agent was still used as the distributor in the inanimate conditions, which explains the discrepancy between the numbers of animate to inanimate agents.

2.2.4 Stimuli and Procedure

Upon arrival at the laboratory the infant and mother engaged in free play until the infant acclimated to the laboratory environment. Acclimation was marked by a baseline behavioral state of a 2 or 3 as outlined by the AFFEX behavioral scaling system (Izard, Dougherty, & Hembree, 1983), indicating that the infant was alert/calm or alert/active, respectively. During free play, the mother was provided one of the wooden rings and instructed to become excited, attempt to share the ring with her infant and try to elicit excitement in the infant to help establish that it was a desirable resource. Following free play, the 10-minute test procedure began and the infant was seated on the caregiver's lap facing away from her

and toward the distribution display at which time they watched six distribution trials (3 animate and 3 inanimate), each followed by a choice phase. Several stimulus and procedural variables were counterbalanced and/or randomized, including color, animal type, pairing, and lateral position of receiving agents, as well as the order of trial types. The caregiver was instructed to remain neutral and not attempt to elicit a choice from the infant or influence the infant in any way. The test phase began when the curtain opened to reveal two receiving agents positioned on either side of the display with empty wooden pegs in front of each of them. A third agent emerged from the cut out in the back of the stage and distributed resources to the receiving agents. Using exaggerated movements, the distributor placed the resources on the wooden pegs in a 5:1 distribution ratio. After the distributing agent dispersed all six resources to the receiving agents, it disappeared through the cut out in the back of the display and the experimenter closed the curtain of the distribution display. Following each of the six trials, a second experimenter, blind to the number of resources each agent had received, emerged from behind the curtain and administered a forced choice procedure by presenting both of the receiving agents at an equal distance from the infant. Infants were prompted (e.g., “which one do you like?” and “can you pick one?”) until they reached for one of the agents. If an infant did not attempt to reach for an agent for 2 minutes it was counted as “no choice”. Reaching and grasping behavior were measured to indicate preference toward the agents, but only when the behavior was preceded by a look toward that same agent. Coding for reaches differed from that of grasps. The infant would have to take hold of the agent and remove it from the experimenter’s hand to be coded as a grasp and signify the end of the trial, whereas reaches were coded across the two minute trial, but reaching behavior alone was not sufficient to end the trial. Additionally, the total duration of infant looking toward each of the agents was recorded. These behavioral measures were video recorded using a camera worn on the chest of the experimenter to be coded offline at a later time.

3. Result

Observation Oriented Modeling (OOM; Grice, 2011; Grice et al., 2012) was used to analyze the data. OOM allows for the comparison of the grasps and looking times made by each infant during each trial with expected patterns of outcomes, with results summarized using accuracy indices identifying how many infants fit the expected pattern. Depending on the statistical test, traditional null hypothesis testing (NHST) relies on a variety of assumptions, such as homogeneity and normality of population distributions, whereas OOM utilizes randomization tests that are free of such assumptions. Many of our agent preference measures violated NHST assumptions, but because OOM is similar to non-parametric methods, we were able to avoid the strict assumptions of NHST and focus attention on the reaches, grasps, and looking times for each agent by the individual infants in the study.

3.1 Hypothesis 1

An ordinal pattern analysis tested the prediction that infants would indicate a preference for an animate agent that had received a smaller number of resources in the distribution paradigm (“animate poor”) compared to an agent that had received a larger number of resources (“animate rich”). With regard to the number of looks per unit of time toward the animate receivers of resources, the expected ordinal pattern for each infant was therefore animate poor > animate rich. Results indicated that 14 of the 25 infants matched this pattern with respect to the number of looks toward animate agents. This frequency can be converted to a percentage (56.00%) which is referred to as the Percent Correctly Classified (PCC) in an Ordinal Pattern Analysis. A simple randomization test was then used to assign a probability statistic, referred to as the chance value (or *c*-value), to the PCC. Based on 1000 random trials for number of looks per unit of time, the *c*-value was .14 indicating that a PCC of at least 56% was likely to occur by chance 14% of the time for the current data and expected ordinal pattern.

For the duration of looks per unit of time toward the animate receivers of resources, the overall ordinal pattern (animate poor > animate rich) was again examined and results indicated that again 14 of the 25 infants (PCC = 56.00, *c*-value = .32) matched the expected pattern and looked more frequently toward the animate poor receiver compared to the animate rich receiver. Additionally, an ordinal pattern analysis (animate poor > animate rich) of the sum of grasps indicated that only 10 of 25 infants (PCC = 40.00, *c*-value = .68) chose the animate poor receiver over the animate rich receiver. Two infants did not complete a grasp to either agent. When the infants that did not grasp an agent were removed from the analysis 10 of 23 infants (PCC = 43.48, *c*-value = .65) choose the animate poor receiver over the animate rich receiver (see Table 1).

3.2 Hypothesis 2

An identical set of Ordinal Pattern Analyses was conducted for the responses to the *inanimate* receiving agent. The expected ordinal pattern outcome for inanimate trials was as follows: inanimate rich > inanimate poor. With respect to the total number of looks per unit of time, results indicated that 16 of the 25 infants (PCC = 64.00, *c*-value = .02) matched the ordinal pattern and looked more frequently toward the inanimate rich receiver compared to the inanimate poor receiver, which was consistent with the original hypothesis for inanimate agent preference. Similarly, 13 of 25 infants (PCC = 52.00, *c*-value = .41) yielded longer durations to the inanimate rich receiver compared to the inanimate poor receiver. However, similar to the grasping in the animate trials, only 7 of 25 infants (PCC = 28.00, *c*-value = .81) completed grasps to the rich receiver compared to the poor receiver. Three infants did not complete a grasp to either agent. When the infants that did not grasp an agent were removed from the analysis this ratio increased to 7 out of 22 (PCC = 31.82, *c*-value = .81) infants choosing completed grasps to the rich compared to the poor receiver (see Table 1).

Table 1. Ordinal Pattern Analysis for Measures Agent Preference for Animate and Inanimate Trials

<i>Ordinal Pattern Tested</i>			
<i>Measure</i>	<i>n</i>	<i>PCC</i>	<i>c-value</i>
<i>Animate: Poor > Rich</i>			
<i>Number of Looks</i>	25	56.00	.14
<i>Duration of Looks</i>	25	56.00	.32
<i>Sum of Grasps</i>	25	40.00	.68
<i>Manual Choosers Only</i>	23	43.48	.65
<i>Inanimate: Poor < Rich</i>			
<i>Number of Looks</i>	25	64.00	.02
<i>Duration of Looks</i>	25	52.00	.72
<i>Sum of Grasps</i>	25	28.00	.81
<i>Manual Choosers Only</i>	22	31.28	.81

Note. Manual Choosers row is an additional Sum of Grasps analysis but includes only the participants that made a manual choice and includes only 22 infants.

4. Discussion

4.1 Hypothesis 1

The primary aim of this study (Hypothesis 1) was to determine if infants showed a preference toward a poor recipient of resources compared to a rich recipient of resources, thereby supporting the contention that infants have the capacity to make social evaluations toward individuals that are treated unfairly and potentially responding empathically toward recipients of fewer resources. While previous research (Geraci & Surian, 2011) has found that infants of similar age to our participants engage in social evaluation toward an *acting distributing* agent, the present study focused on the social evaluation of *passive receiving* agents. In the animate trials, only a small majority (56.00%) of the infants followed our hypothesized pattern with regard to number and duration of looks. Further, when infants grasped one of the two receivers, a greater number of infants chose the rich receiver more often. As these findings were weak, relative to those previously discussed that provided a basis for this study, it does not provide substantial evidence that infants are being motivated by social evaluation to the poor receiver over the rich and rather indicates that evaluating a passive receiving agent may be fundamentally different from evaluations of an acting distributing agent.

Alternatively, there could be components of our methodology that are influencing infant behaviors. The research of Meristo and Surian (2013) appears to indicate that when making social evaluations based on equity distributions, infants as young as 10 months of age take social contexts such as deservingness

and merit into consideration. Further, these expectations are found to increase across infancy as infants become capable of more complex cognitive processes (Surian & Franchin, 2017). As the distribution paradigm in the present study did not provide any social context that would allow for the appraisal of deservingness or merit, it is possible that infant responses were influenced by the lack of social context. Similarly, receiving agents remained static during the distribution paradigm, giving no indication that the receivers were “excited” or “disappointed” by the number of resources received. A lack of response by the receiving agents may have been interpreted by the infants as indifference toward the allocated resources, either toward the resources themselves, or toward the inequitable distribution.

The lack of response by the receivers was a result of a direct methodological choice to reduce bias in response differences. For example, in a hill-climbing paradigm used by Hamlin and colleagues (2007) focusing on infant preferences for helping behaviors versus hindering behaviors, a protagonist “climber” bounced after being helped up the hill by a “helping” agent. The findings were robust in that a significant number of infants indicated a preference for a helping agent compared to a hindering agent through their looking and grasping behaviors. However, these results were challenged by Scarf and colleagues (2012) when they demonstrated that infants chose the helping agent when the protagonist bounced after being helped up the hill, but chose the hindering agent when the protagonist bounced after being “pushed” down the hill. When the protagonist bounced in both the helping and the hindering trials, the infants showed no significant differences in preference and chose both equally. Therefore, while the inclusion of an “emotional” response by the receiving agents may have increased clarity of how these agents *should* feel in response to inequitable resource distribution, it may also have introduced a confounding perceptual or emotional bias.

An additional replication of the hill-climbing study was recently conducted and found less than half of the infants choose the helping agent compared to the hindering agent (Colaizzi, 2016). Hamlin (personal communication, May 25, 2016) attributed this deviation in findings to minor methodological differences in the color of the agents being used in the paradigm. Specifically, Hamlin stated that infants tend to demonstrate a preference for the color blue (one of the colors of the agents) and that the use of a blue agent in the paradigm may have skewed the results in the replication study even though the roles of the agents were counterbalanced.

Another failed replication occurred in an attempt to replicate the findings of Hamlin and Wynn (2011). In that study, a protagonist agent attempts to open a box and attain a toy. Similar to the 2007 research, one condition showed a helping agent facilitate the protagonist in opening the box and a second condition showed a hindering agent inhibit the protagonist in opening the box. Once again, while findings from this initial study were robust with a significant number of infants (79%) at both 5 and 8 months of age preferring the helper over the hinderer, Salvadori et al. (2015) found that only 62% of the infants in their replication paradigm demonstrated a preference for the helper compared to the

hinderer. Similar to Colaizzi (2016), Salvadori et al. (2015) attributed these differences to minor methodological dissimilarities of procedure, materials, or demography. However, the findings of Hamlin and Wynn (2011) were robust enough that they should still be evident in the face of only *minor* dissimilarities. One methodological issue that is not addressed with the original 2011 study and then again overlooked by Salvadori and colleagues (2015) is the noise that occurs when the box lid is slammed shut by the hindering agent. Although not outlined in the publication, in a recording of the paradigm (Hewitt & Bloom, 2013) there is a clear, audible noise when the hindering agent slams the lid of the box closed. It is plausible that the infants have an aversion to a loud noise that causes them to react negatively toward the hindering agent, making it appear as though they are showing a preference toward the helping agent. This methodological issue should be addressed in further replications. Together these three studies, coupled with the present findings, indicate that the research on social evaluations and the conclusions drawn from their findings are not conclusive and remain questionable due to mixed results across this area of study.

4.2 Hypothesis 2

Hypothesis 2 predicted that behavioral differences in preference toward the receiving agents when resources were distributed unevenly between two non-social entities, or inanimate receiving agents. Based on basic evolutionary theory and natural selection (Darwin, 1965), humans are motivated to seek out the best possible source for resources that aid in survival and reproduction. Therefore, we hypothesized that in the absence of social entities (i.e., agents with animate facial features), infants would be more likely to demonstrate a preference toward the rich inanimate receiver, thereby indicating a preference for aligning with the best possible outcome for survival. Though a greater number of infants looked more frequently and longer at the rich receiving agent with more resources to potentially “share”, this number was just over half, but yielded a robust *c*-value of .02, but these preference behaviors did not extend to the grasping measure, with a minority of infants choosing the rich over the poor receiver.

Previous research found that infants do not place similar expectations of equitable resource distribution on the distributing agent when allocating resources to inanimate agents such that infants look equally between the fair and unfair distributor (Sloan et al., 2012). This is further supported by Gredeback, et al. (2015) who found that neural responses in the p400 ERP, a component of the brain that has been previously linked to empathy and prosocial responding, only occurred when the agents in the paradigm were animate (i.e., had eyes), suggesting that when the social valence is removed from the paradigm, the action is no longer interpreted by the infant as being goal-related. Again, Sloan et al. (2012) and others using similar paradigms are still making claims regarding infant evaluation between fair and unfair animate distributing agents that had distributed to inanimate objects, thus, still evaluating the social actor. In the present study, the distributing agent is still animate even in the inanimate trials, but

the infants are only making social evaluations directed toward the inanimate receiving agents. In other words, the direction of their social evaluation in the present paradigm is toward inanimate objects, which differs from the previously conducted research. However, a greater number of infants did look longer at the inanimate agent with greater resources, which could be an indicator that infants do have an interest in a greater number of resources when issues of morality are minimized.

Once again, the findings of this study were not as robust as those of previous studies using similar paradigms (Geraci & Surian, 2011; Hamlin & Wynn, 2011; Schmidt & Sommerville, 2011). Hamlin et al. (2007) found that infants preferred a prosocial helping agent over an antisocial hindering agent, but did not attribute their own attitudes to the protagonist that had been helped or hindered. In other words, infants may be capable of evaluating the actions of others before they are capable of evaluating the effects of those actions on passive receivers, a process that requires perspective taking, which some suggest emerges around 18 months of age (Thompson, 1987), the average age of our sample. If perspective taking is just emerging at this time, it would be reasonable to suggest that this cognitive skill may not be developed enough to attribute actions to passive receivers that are either lacking facial features or lacking previous behavior that would provide a social context for the infant.

4.3 Implications

To summarize, this study did not provide robust evidence that infants are evaluating the equitable or inequitable distribution of passive receiving agents and it is plausible to suggest that infant's social evaluations of a passive receiving agent differ from their evaluations of an acting distributing agent. While they may be engaging in social evaluation toward both parties, the evidence of social evaluations toward agents making the choice to distribute evenly or unevenly is much stronger than the evidence provided by the current study, though considerations of the multiple failed replication attempts should be made before making claims that infants are capable of any of the evaluative and preferential responses to which the previous research is alluding.

Previous research in this area has aided in informing much of what we already know about prosocial understanding, inequitable resource distribution, and empathic responses to these behaviors by infants. However, in order to gain traction in this area of research and learn more about the developmental trajectories of the various forms of social evaluation we must expand on the current research and supplement the field with new means for the identification of social evaluation, an area crucial to a well-rounded understanding of the socialization process.

4.4 Limitations and Future Directions

One way that future research can help to clarify the outcome of this study is to provide an opportunity for infants to either distribute or reallocate resources between the rich and poor receivers. Hamlin et al. (2011) found that when given the option to either give or take a treat away from prosocial or anti-social agents, toddlers in the "give a treat" condition distributed treats more often to the prosocial rather than

the anti-social agent. Similarly, toddlers asked to “take a treat” removed the treat from the anti-social agent more often than they removed a treat from the prosocial agent. If infants are making social evaluations toward receivers similar to their evaluations of distributors, they would likely be inclined to reallocate resources evenly if given the opportunity, or to distribute additional resources to the poor receiver in an attempt to achieve fairness.

As mentioned previously, neither the poor nor the rich agent responded upon receiving resources. This was purposeful to prevent preference based on any perceptual or emotional biases that agent response may have elicited. However, modifying the paradigm to include some indication that the receivers are happy or unhappy with their allotted resources may be necessary. If having the protagonist “bounce” upon receiving help leads to preference of the agent nearest the bouncing protagonist as it was found to do in the study by Scarf and colleagues (2012), then it may be necessary to include a different indicator that the agents are interested in the resources. Providing a familiarization trial in which the agents interact with the resources and indicate excitement toward the resources may be enough to inform the infants that receiving more resources should excite them and receiving fewer resources should disappoint them.

Another modification that could be included in a future study would be the inclusion of a parental self-report on the sharing behaviors of their infants in other social situations. Background information on the infants understanding of sharing and fairness would be beneficial and could provide some insight as to how their environment and their interactions with caregivers and peers influence their tendency to make social evaluations regarding unequal resource distribution.

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