The Waiting Game: A Review of the Marshmallow Task and its Impact on Society

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ABSTRACT

The marshmallow task is a psychological test used for many decades to test young children's capability to delay gratification. The basic procedure task consisted of four aspects: an activity, a reward, a choice, and a period of delayed gratification. Through diving into the classic and modern experiments of the marshmallow task and synthesizing the findings, this paper reviewed the topic of self-control as the primary driving force of influence behind the subject's performance. This review considered the various influences that impact performance and consequentially the results and conclusions, including self-control, the experimenter's perceived reliability, culture, power of habit, and reputation management. The period of the experiments covered in this review ranges from the studies from 1962, including the classic Stanford Marshmallow Experiment, to the modern findings, with the most recent one performed in 2023. By taking into account different investigative points, this review could help readers better understand the findings that stem from the marshmallow task and how they translate into society, in addition to new perspectives and testing variables for future research. Suggested changes for the task include expanding the age limit and changing the reward type.

Keywords: marshmallow test, marshmallow experiment, self control, psychology, Stanford experiment, gratification, impulsivity, reward processing

INTRODUCTION

The marshmallow task is a psychological experiment that gained widespread acknowledgment for measuring children's ability to delay gratification. Beginning in the 1960s, psychologist Walter Mischel initiated this series of studies, and its most renowned hypothesis is related to a potential prediction of the children's future success. Key characteristics of the task are typically children between the ages of three and five as main subjects and food options such as marshmallows or pretzels as usual reward choices.

The marshmallow task has significantly contributed to psychology and social science's principal areas, bringing further understanding of self-control, emotional intelligence, and the importance of social factors. The basic procedure of the marshmallow task consisted of four aspects: an activity, a reward, a choice, and a period of delayed gratification. A standard example would be that a child completes a task - such as doing a quiz - and the experimenter offers a treat as a reward. Usually, the treat is a food-related substance, but this is not a strict condition. The child is then given the choice between having one reward now or waiting for a defined period (typically 15 minutes) to get double the original amount. Subsequently, the experimenter leaves the room for the defined time or until the child indicates they wish to stop waiting and obtain the one reward.

In recent years, psychologists have used the results obtained from this task to explore topics such as reputation management (Ma et al., 2020), as well as situational factors like the visibility of the reward (Mischel & Ebbesen, 1970). However, despite these discoveries, the initial goal of the test was to explore a child's ability to delay gratification and the potential correlations between that and success in the subject's future. One of the initial versions of the task - known as The Stanford Marshmallow Experiment - aimed to investigate respectively, the effect of overt and cognitive activities, as well as lack of either, on the performance of preschoolers when faced with a delay of gratification task (Mischel & Metzner, 1962). Following the original research, numerous repetitions of the marshmallow task resulted in new findings offering a fresh take on the task and its results, some of which will be detailed in this paper.

Firstly, this paper synthesized early studies from 1962 to 1990 about the marshmallow task. Secondly, arguments on how self-control is not the primary factor that affects marshmallow task performance were presented with evidence from contemporary literature and research. These presented important variables, such as reputation management (Ma et al., 2020), perceived reliability of the experimenter (Kidd et al., 2013), linguistic and racial cues (Pierre et al., 2023), and the power of habit (Yanaoka et al., 2022) to influence performance and results. Finally, this paper presented suggestions for future research regarding the marshmallow task.

CLASSIC RESEARCh

Mischel and Metzner (1962), aiming to clarify the relationship between delaying capacity and perspective of future time, performed the marshmallow task focused on the subject's factors such as age, intelligence, and perception of the value of an object. The experiment offered options of delayed gratification time from one day to four weeks with a chocolate bar of varying monetary value as the reward. A quiz consisting of eight questions regarding the future was used to measure the future time perspective of the subjects. The results displayed a trend that aligns with the hypothesis that the proportion of delayed reward choices increased as the age of the subjects increased, as well as for those with a higher IQ.

To explore a situational factor of the marshmallow task, psychologists Mischel and Ebbesen (1970) focused on the correlation between the degree of attention paid to the reward and the length of time waited. During the experiment, the subjects could either see their preferred reward, their less preferred reward, both rewards, or none of the rewards. The children's ages ranged from three years and six months as the youngest to five years and eight

months as the oldest. To develop familiarity, the experimenters spent a week playing with the children. The results depicted that the children waited the longest when the rewards were absent and waited the shortest amount of time when both rewards were in their view; this was the opposite of the predictions. About 75% of the subjects waited the maximum time of 15 minutes when no rewards could be seen, but no child waited this amount of time when both rewards were in sight, aligning with the results of the average time waiting. Therefore, children have the least self-control when the rewards are present; this makes sense as it is easier to forget about an object if it is out of sight.

While the above research focused on what factors influence performance on the marshmallow task, how does this performance affect later life outcomes? The experiment conducted by Shoda et al. (1990) investigated whether children were more likely to wait if the reward was exposed to them and if they were given ideation of what to think during the delay period. The subjects were separated into four groups with two major differences regarding the investigative points and conducted the standard procedure of the marshmallow task. Additionally, three questionnaires - the Adolescent Coping Questionnaire, the California Child Q-Set, and to find out their SAT scores - were sent to the respective parents of the children to gain further insight. The results of the ACQ showed alignment with the understanding that those who chose the delayed reward could exhibit higher levels of self-control. In addition, SAT scores portrayed a positive correlation between delay times and results when rewards were exposed, but the correlation was negative and insignificant in other conditions. These results show that those who wait longer on the marshmallow task may have more success in later life due to the increased levels of self-control and the positive correlation between SAT scores and delay times.

The main theory of the marshmallow task is that those who choose to wait will lead a more successful life due to the primary aspect of a high level of self-control. On one hand, studies like Mischel and Metzner (1962) and Shoda (1990) provide evidence that corroborates the theory, when factors such as intelligence were considered and measurements such as SAT scores were utilized. On the other hand, there is compelling evidence that self-control is not the most significant driving force behind subjects' choices in the marshmallow task, a theory explored in the following section of the paper.

CONTEMPORARY RESEARCH

Contemporary research discussed in this paper are experiments run in the early 21st century - from 2013 to 2023 - and the findings that came from them. These modern takes on the marshmallow task provide different perspectives and lead to a more varied understanding of the results stemming from the experiment. Reputation management, reliability, and identity of the experimenter were considered the three advanced and significant aspects of the marshmallow task. Moreover, an experiment not directly linked to the marshmallow task was included, further contextualizing the use of rational thought in decision-making from the infant years.

A potentially important driving force behind one's actions in the marshmallow task is reputation management, as Ma et al. (2020) explored. In Hangzhou, China, children from three to four years old were separated into three testing conditions of the standard marshmallow task. In the first condition, the marshmallow task standard procedure was followed; in the second condition, a friend of the subject would know their choice; in the third condition, the subject's teacher would know their choice. The experimenters hypothesized that the amount of time the subjects chose to wait would occur in descending order of the teacher condition, peer condition, and standard condition, indicating reputation management is an undeniable point to consider regarding the marshmallow task results. The experiment first used stickers as a reward and a bell to stop the task, and then the process was repeated with cookies for rewards. The results revealed that those who are in the teacher condition (68%) were more likely to wait the full 15 minutes compared to those in the peer (40%) or standard (16%) condition. In addition, results showcased that age has an important effect as older children waited longer on

average. Aligning with the experimenter's prediction, these results depicted that reputation management plays a significant role in a subject's actions in the marshmallow task.

Another example of alternative reasons behind a subject's performance analyzed in the marshmallow task is the perceived reliability of the researcher by the child. In an experiment by Kidd et al. (2013) subjects were randomly assigned to one of two conditions: a reliable or an unreliable experimenter. Such reliability was proved to the child in an art project: there were two instances where the subject was offered new materials to draw with, and in the reliable condition, the researcher returned with the promised goods, and in the unreliable condition, the researcher did not. The marshmallow task immediately followed the art project activity. The results of this experiment display that the children used rational thinking to make their choices. In the unreliable condition, only one out of 14 children waited the complete 15 minutes, while in the reliable condition, nine out of 14 waited the same amount of time. These results showed that those in the unreliable condition were significantly less likely to wait the full amount of time than those in the reliable condition. The results portray that - even at the ages of three to ten - the subjects are using logic to decide whether to wait for the second treat depending on the level of reliability presented to them by the experimenter.

While the above research mainly focuses on young children, one may wonder at what age humans begin using rational thought to make decisions. Lucca et al. (2020) examined this question with infants as their subjects. The infants were placed in three different conditions of varying difficulty. During the experiment, the experimenter showed the subjects their competency and the varying difficulty of the tasks. The infants then tried the same task to obtain a toy in a glass box. According to the results, in the impossible and easy conditions, the time spent on the task decreased exponentially across the trials, while in the hard conditions, the time remained constant. As for pulling force, the infants applied high levels of force consistently in the easy condition, increasingly high levels of force in the hard condition, and consistently low levels of force in the impossible condition. These results all point toward infants' ability to use rational thought to help them make decisions. Moreover, these results act in parallel with the findings from the experiment conducted by Kidd et al. (2013) as in this study infants are shown the difficulty of the task by adults, which is akin to the perceived reliability element in the study conducted by Kidd et al. (2013). To further this, this experiment brings more into the discoveries from the previous paper as it displays how early this capacity is portrayed.

Separating from individual factors, a part of the marshmallow task that may affect results is the identity of the experimenter. Pierre et al. (2023) tested how linguistic and race cues affected a subject's performance on the marshmallow task. The range of experimenters was two native speakers - with Canadian accents - and two non-native speakers (one experimenter had a Chinese accent, and the other had a Ukrainian accent). The children were split into groups of 40 per experimenter and subcategories of 20 in the condition with grammatical mistakes and the other 20 in the condition without mistakes. The results showed that these aspects had little significance on the subjects' performance. The only noteworthy result is that white children interacting with an experimenter with a Chinese accent were more likely to delay gratification compared to white children interacting with a white experimenter. However, the hypothesis and effects of this experiment require further exploration to reach a dependable conclusion.

An experiment with extrinsic investigative points was performed by Yanaoka et al. (2022) to investigate the power of habit and culture in delaying gratification. 80 Japanese and 58 American children between the ages of four and five were tested; they were randomly assigned to food-based reward or the gift reward experimental condition. Parents and children were also asked to complete two surveys each to obtain more information. In the initial hypothesis, Japanese children would wait longer for delayed rewards in the food condition, and American children would wait longer in the gift condition as this aligned with their cultural

habits. This hypothesis was confirmed with Japanese children, but it was different for American children; this may be because their habits are not as strong, and thus they were not as accustomed to waiting for gifts and the effect of this habit is not as cemented. Moreover, children with a higher sensitivity to social conventions and more inhibitory control waited longer for the delayed rewards in both cultures. These results shed light on another point that could influence the results of the marshmallow task, which could be investigated in more depth. They also provide further proof that the marshmallow task may be used to indicate levels of self-control.

FUTURE RESEARCH

One aspect of the marshmallow task which could be explored further is the substance of the reward. Would the wait time be different if the reward were not food but - for example - time on electronics? In this modern age, when children are being exposed to electronics at a very young age, this may reveal more about their self-control. To investigate, researchers could control the reward time spent on electronics per the wait time. One way is to have levels of waiting where the wait time is double the amount of time spent on electronics (wait 10 minutes for five minutes on electronics, 20 for 10, and so on). However, it is important to consider the activity done on the electronics. For example, are the children playing games or watching short videos? In this experiment, self-control would be assessed on each level while opportunities to stop waiting are presented often. This experiment may bring forward the variable of desire in alignment with self-control. Given the results from Mischel et al. (1970), in which children waited longer when the rewards were out of sight, a possible prediction is that the subjects would not wait long as the reward and opportunity to stop waiting are constantly presented to them.

Moving onto individual factors, one side that can be developed is the effect of schooling on children. Comparing the children's performance from different schools would allow more insight into whether self-control is an innate principle or if it can be learned or trained. To investigate, researchers could swap students between schools considered less academically rigorous to one considered more rigorous, for a specific period (eg: 1 month). In this case, a more academically rigorous school pushes and aids its students to achieve academic excellence and adopts a more high-pressure timetable and environment. The students could perform the marshmallow task before and after their exchange to provide comparable evidence. This experiment would test whether a rigid school environment could train self-control in subjects. Given the results from Ma et al. (2020), linking reputation management and a general prediction, it could be argued that the subjects would develop a stronger sense of self-control after their exchange.

The subjects' age group is the broadest individual factor that could be examined. Would the marshmallow task have the same effect on teenagers or adults? The experiment could be performed on these age groups with alterations while keeping the key variables of reward and wait time. One necessary alteration would be the reward itself; teenagers and adults would be unwilling to wait for a reward like marshmallows. Thus, a suitable replacement would be a reward such as money. The principal components would be the amount of money and waiting time. Based on the results from Mischel et al. (1970), one could predict that the older the subject, the more likely they would wait for a suitable reward.

SOCIETAL IMPACTS

With its perceived ability to predict future success and measure self control, the marshmallow task has made a notable impact on society. A facet of this is the portrayal of the marshmallow task in the media. Most commonly depicted in shows aimed at children, the marshmallow task is used as both a warning and an educational tool. In *The Simpsons* episode "Treehouse of Horror IV" (Groening, 1993), Homer is so desperate for a doughnut, he strikes a deal with the devil. As Homer consumes the whole doughnut with no hesitation, his soul belongs to the devil, displaying the negative consequences due to his lack of restraint. What message does this bring to the audience? Homer

is portrayed as an immature and childish character who is comedically foolish as he habitually makes bad decisions. Although his errors in judgement provide high entertainment value, Homer and the doughnut test show children that instant gratification is not the best choice in most cases due to the high likelihood of ending up in a disadvantageous situation. In this case, the marshmallow task is utilised as an implicit warning. Moreover, another famous television programme designed for children which broadcasts the marshmallow task is Sesame Street with a focus on the Cookie Monster. There are many videos of the Cookie Monster in collaboration with the National Public Radio (NPR, 2019), celebrities such as Sir Ian McKellen (Sesame Street, 2014), and singing songs (Sesame Street, 2013) on the topic of self-regulation, using a procedure akin to the one of the marshmallow task with cookies as rewards. This is a highly effective way of spreading the importance of self-regulation to young children as the Cookie Monster is a humorous and relatable character in his unwillingness to wait for rewards. In the collaboration video between National Public Radio and the Cookie Monster (NPR, 2019), there are mentions of strategies to aid the delay of gratification, such as to take deep breaths and talk about another subject. This is immensely helpful to children to help them learn how to effectively self-regulate, as well as teaching the importance of self-control. In this way, the Cookie Monster acts as a guide and an educational tool to bring awareness to younger children on the significance of self-control. The effect of the marshmallow task on society is evident through its portrayal as a warning and educational tool in film and television programmes, highlighting the effectiveness on children. However, how does the marshmallow task shape societal views on the correlation between self-control and success?

The influence of the results of the marshmallow task are most prominent in education and parenting, affirming the idea that self-control is a major deciding factor of future success. In the book Grit: The Power of Passion and Perseverance by Angela Duckworth there are references of the marshmallow task to emphasize how self-control is more predictive of success than talent or IQ as it leads to one key feature of successful people: grit. Duckworth connects the levels of self control shown from the marshmallow task to the societal values of grit (Duckworth, 2016) because the more self control one has, the more likely they can persevere in the face of adversity and dedicate time and effort into their endeavours, leading to ultimate success. In addition, the ability to delay gratification is seen as the cornerstone of the American Dream (Duckworth, 2016), a concept which is approved of by many and emphasises the correlation of hard work and success. According to the American Dream, being able to fight impulses and focus on passion, perseverance, and the bigger reward in the future is crucial to achieving this goal, as well as displaying the importance of discipline in achieving success. The marshmallow task heavily links to the American Dream as well as grit as a factor for future success. Consequentially, the influence on parenting and education stem from the connotations between self control – or grit – and future success. Many parents and teachers focus heavily on this ability of their children and students, urging all to constantly hone into this skill until it is highly stable. As easy as it is to prioritise self regulation primarily, it is essential to keep in mind that as humans, perfection is impossible, and it is beneficial to choose instant gratification at times. The book The Self-Driven Child: The Science and Sense of Giving Your Kids More Control Over Their Lives by William Strixrud and Ned Johnson (Strixrud & Johnson, 2018) argue for giving one's children more control over their lives; there are references to the marshmallow task to discuss how fostering autonomy and resilience in children can significantly improve their ability to delay gratification and manage stress, a skill which is incredibly useful. However, excess emphasis on this could lead to strong self regulation skills at the expense of mental health. Therefore, the marshmallow task has made impacts on society, especially in the parenting and education sectors; although there are notable links between high levels of self control – which can be deduced from the results of the marshmallow task – and success, it is key to ensure self regulatory skills are not prioritised over one's mental health.

Many studies in this paper depict the variety of factors which can affect one's decision making when participating in the marshmallow task. These include but are not limited to reputation management (Ma et al, 2020) and experimenter identity (Pierre et al., 2023). The results of these studies contribute significantly to our understanding of decision making, as well as reduce the credibility of the marshmallow task as a deciding factor for success as other aspects aside from self control come into play. A further factor to take into consideration for decision making is access to resources. The book Scarcity: Why Having Too Little Means So Much by Sendhil Mullainathan and Eldar Shafir discusses the marshmallow task in the context of poverty. The book argues that scarcity of resources, time, and energy impairs decision-making and self control abilities as well as critiques societal expectations that individuals should exhibit these qualities without acknowledging systemic inequalities. This argument that delaying gratification is much more difficult under constraints of resources is a logical one as the toll of poverty or poor access to necessary resources can lead to an illogical desperation and thus a bad decision-making process. This aspect is one which needs to be considered when conducting the marshmallow task and brings great contribution to our understanding of decision making.

CONCLUSION

The marshmallow task aims to help researchers discover the various influences that affect a subject's performance and the consequential conclusions that can be drawn. The classic studies put self-control as the main driving factor behind the test's waiting time phase. The initial experiments explored individual factors - such as age and intelligence - and situational factors - like degree of attention paid and exposure to the reward - to discover how one can use the marshmallow task in alignment with self-control to predict potential future success. Modern takes on the marshmallow task explored other important variables, especially the influences on the task. Some aspects investigated were reputation management, identity, perceived reliability of the experimenter, habit, and culture.

The marshmallow task is significant because it can aid researchers in making scientific discoveries about the driving forces behind different behaviors, linking them to society and daily life. Future research could conduct experiments changing the substance of the reward and the participant's age, and analyzing the impact of schooling on children. This development would not only advance the marshmallow task itself but also the conclusions that can be drawn from it.

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