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Article

The Temporality of Rewards: Analysis of the Impacts of Positive and Negative Habits

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Abstract: This study explores the relationship between positive and negative habits and their rewards over time. Using a bibliographic and documentary approach, we analyze how the temporality of rewards influences the formation and maintenance of habits. We developed the "habit chart", which shows that positive habits, such as reading, healthy eating, physical exercise, meditation and personal relationships, offer incremental and lasting rewards. In contrast, negative habits such as sugar consumption, excessive use of social media and a sedentary lifestyle provide immediate gratification followed by a sharp decline. The analysis was based on studies such as those by Warburton et al. (2006), Lally et al. (2010), and Hu (2003) for positive habits, and Malik et al. (2010) and Kross et al. (2013) for negative habits. We conclude that practical strategies, such as financial incentives and creating enabling environments, can make long-term rewards more tangible, promoting the adoption of healthy behaviors. This study reinforces the importance of the temporality of rewards in habit formation and suggests evidence-based interventions to improve quality of life and general well-being.

Keywords: positive habits; negative habits; reward system; habit formation

1. Introduction

Habits play a crucial role in the health and well-being of individuals, influencing both quality of life and longevity. According to Duhigg (2012), author of "The Power of Habit", habits are behavioral routines repeated regularly and tend to occur unconsciously. They form the basis of our daily lives and can be divided into two main types: positive habits and negative habits.

1.1. Importance of Habits in Health and Well-Being

Positive habits, such as regular exercise, a balanced diet and meditation, are widely recognized for their benefits for physical and mental health. According to Lally et al. (2010) in a study published in the European Journal of Social Psychology, the adoption of positive habits is associated with a longer life expectancy and a significant reduction in the risk of chronic diseases, such as heart disease and diabetes.

On the other hand, negative habits, such as excessive alcohol consumption, smoking and a sedentary lifestyle, have considerable adverse effects, contributing to a series of health problems. The study by Prochaska et al. (2008) in the journal Health Psychology points out that changing negative to positive behaviors is essential for improving public health.

1.2. Definition of Positive and Negative Habits

Positive habits are behaviors that promote long-term health and well-being. Examples include regular physical activity, such as walking or running, which, according to Warburton, Nicol, and Bredin (2006) in the Canadian Medical Association Journal, improve cardiovascular health and increase longevity. A healthy diet, rich in fruits, vegetables and whole grains, is another example of a positive habit, as highlighted by Hu (2003) in the New England Journal of Medicine.

In contrast, negative habits are behaviors that, although they often provide immediate pleasure or relief, result in adverse long-term consequences. Consuming foods rich in sugar and saturated fats, for example, can lead to weight gain and an increased risk of metabolic diseases, as observed by Malik

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et al. (2010) in the American Journal of Clinical Nutrition. Excessive use of social media, which provides instant gratification, can result in addiction and mental health problems, as discussed by Kross et al. (2013) in the journal PLOS ONE.

1.3. Introduction to the Idea of Reward and Its Temporality

The idea of reward is central to habit formation. According to Skinner (1938), in his theory of operant conditioning, behaviors that are followed by rewards are more likely to be repeated. However, the temporality of rewards plays a critical role. Immediate rewards, associated with negative habits, tend to be more effective in encouraging repetitive behaviors than delayed rewards, typical of positive habits. This phenomenon is highlighted in the study by Schultz et al. (1997) published in the journal Nature, which demonstrates how dopamine, a neurotransmitter associated with pleasure, is released in response to immediate rewards, reinforcing behaviors.

1.4. Objectives of the Article

This article aims to investigate the temporality of rewards associated with positive and negative habits, and how this dynamic influences the adoption and maintenance of these behaviors. Using a quantitative approach, the "habit graph" was developed, which measures the relationship between habits and their respective rewards over time. It is expected to demonstrate that the immediate gratification associated with negative habits represents a significant challenge for the promotion of healthy habits. Finally, practical strategies are suggested to encourage the adoption of positive habits, making long-term rewards more tangible and accessible.

2. Methodology

2.1. Description of the Approach Used to Analyze Habits

The methodology of this article is based on bibliographical and documentary research, with the aim of exploring and analyzing the temporality of rewards associated with positive and negative habits. The choice for an exclusively bibliographical approach is justified by the wide availability of data and previously published studies that address habit formation, the psychology of rewards, and the impacts of different behaviors on health and well-being. As mentioned by Gil (2008), bibliographic research is a valuable methodology for obtaining in-depth knowledge on a given topic, allowing the identification, analysis and synthesis of relevant studies for the construction of new understandings.

The focus of the analysis was the critical review of articles published in high-impact journals, mainly those indexed in the upper strata of the Qualis-CAPES system (B1, B2, A1, A2), as well as consultation of reference books that deal with the concepts of habits and rewards. Among the sources consulted are studies of behavioral psychology, neuroscience, and public health, areas that provide a solid basis for understanding the dynamics involved in the formation and maintenance of habits.

2.2. Tools and Methods for Measuring Rewards

To measure the rewards associated with different habits over time, we used a conceptual model based on Skinner's operant conditioning theory (1938), which postulates that immediate rewards tend to reinforce behaviors more effectively than long-term rewards. This model was adapted to construct the "habit graph", which illustrates the temporal relationship between positive and negative habits and their respective rewards.

The "habit graph" was developed from secondary data, extracted from studies that investigated the short and long-term effects of various behaviors. For example, studies such as those by Malik et al. (2010) and Warburton et al. (2006) provided data on the immediate and future impacts of eating habits and physical activity, respectively. Rewards were categorized into immediate and long-term, based on criteria established in the literature, such as those described by Schultz et al. (1997), who explored the neural response to temporal rewards.

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The graph was created using data analysis software (Excel), where the variables were organized on axes representing time (X axis) and reward intensity (Y axis). Positive habits were plotted with ascending curves over time, reflecting the gradual increase in reward, while negative habits showed an initial peak followed by a decline.

2.3. Analysis Procedures

Data analysis followed a process of interpretative synthesis, in which findings from different studies were integrated to provide a holistic view of the relationship between habits and rewards. As described by Bardin (2011) in his content analysis methodology, the data was examined with the aim of identifying emerging patterns and categories that reveal how the temporality of rewards influences the formation and maintenance of habits.

Initially, the data was organized into thematic categories, such as "positive habits" and "negative habits", and subcategories such as "immediate rewards" and "long-term rewards". Then, the results were compared with each other and with existing literature to verify the consistency and relevance of the identified patterns. This method allowed the construction of a robust conceptual framework, which supports the conclusions and recommendations presented in the article.

The analytical approach employed also considered the practical implications of the findings. From the synthesized data, strategies were formulated that can help promote healthy habits, addressing the challenge of immediate versus delayed gratification. These strategies are discussed in the discussion section of the article, based on behavioral theories and empirical evidence.

3. Literature Review

3.1. Summary of Previous Studies on Habits and Rewards

The relationship between habits and rewards has been widely studied in the literature, with several researchers exploring how reinforcements, both positive and negative, shape human behavior over time. According to Wood and Neal (2007), habits are learned actions that become automatic and are often triggered by a specific context. However, the role of rewards is central to the formation and maintenance of these habits, as demonstrated by Schultz et al. (1997), who highlighted the importance of rewards in activating dopamine circuits in the brain, reinforcing specific behaviors.

One of the most influential theories in this area is that of Skinner (1938), who proposed the concept of operant conditioning, in which behaviors are shaped by their consequences. Positive rewards increase the probability of repeating the behavior, while punishments or the absence of rewards tend to decrease this probability. Subsequent studies, such as those by Lally et al. (2010), show that the formation of a new habit can take from 18 to 254 days, depending on the complexity of the behavior and the consistency of the associated rewards.

Rewards can be tangible, such as food or money, or intangible, such as praise or feelings of well-being. However, the temporality of rewards—whether they are immediate or delayed—plays a crucial role in maintaining habits, a topic that has been central in behavior change research.

3.2. Discussion on the Psychology of Immediate versus Long-Term Rewards

The psychology of immediate versus long-term rewards has been a focus of interest in behavioral studies. Immediate rewards, such as those associated with consuming high-calorie foods or using social media, are often more effective in shaping behavior due to their instant gratification. As highlighted by Loewenstein et al. (2001), immediate rewards activate areas of the brain associated with pleasure, creating a reinforcement cycle that makes it difficult to change negative habits.

On the other hand, long-term rewards, such as the benefits of healthy eating or regular exercise, require greater effort and patience, which can make adopting and maintaining these habits more challenging. Heatherton and Wagner (2011) suggest that the difficulty in prioritizing long-term rewards is related to the limited capacity for self-control, which can be easily overwhelmed by stimuli that offer immediate gratification.

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The literature also points out that dependence on immediate rewards can lead to harmful behaviors in the long term. A study by Sussman et al. (2011) published in the *Annual Review of Clinical Psychology* discusses how addictive behaviors, including substance consumption and excessive use of technology, are closely linked to the search for immediate gratification, even in the face of long-term negative consequences.

3.3. Analysis of Behavioral Tendencies Related to Habits

Habit-related behavioral tendencies show that humans are naturally inclined to seek immediate rewards, an evolutionary trait that ensured survival in environments where resources were scarce and uncertain. However, in modern contexts, this predisposition can result in unhealthy choices. A study by Duckworth et al. (2014) published in *Psychological Science* suggests that promoting healthy habits depends on the ability to train self-control and create reward systems that make long-term benefits more tangible and accessible.

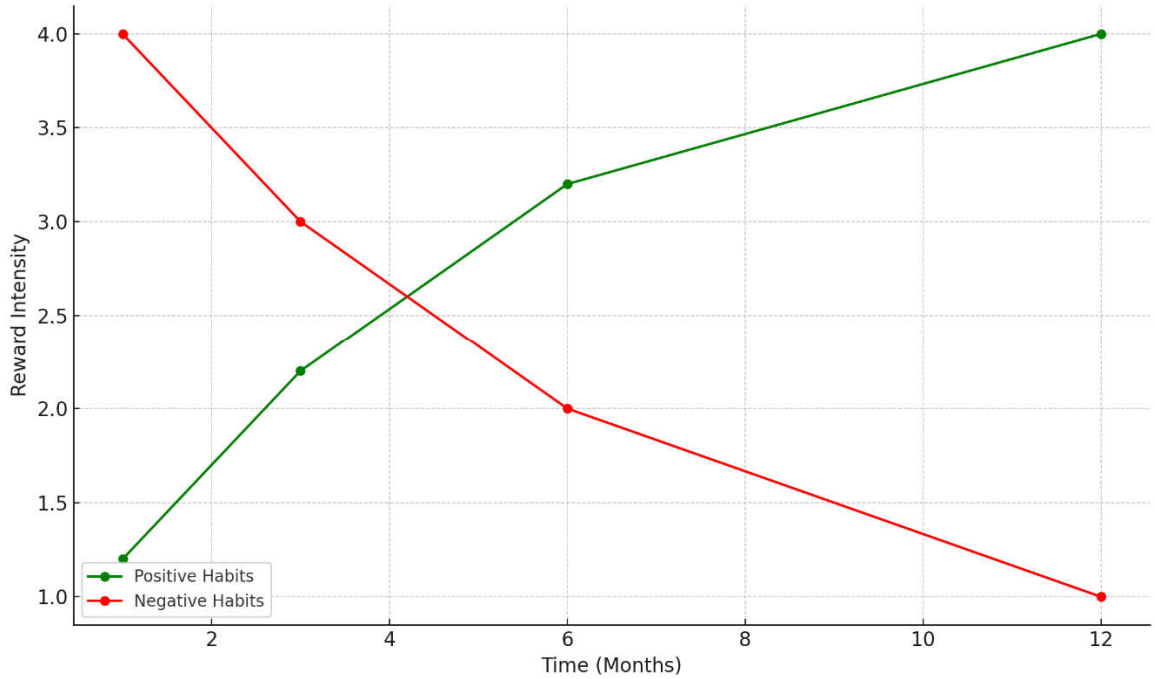
Furthermore, recent literature has explored behavioral interventions that seek to reduce attraction to immediate rewards. Mischel et al. (2014), in their research on the "marshmallow test", show that children who are able to delay gratification are more likely to develop healthy and successful behaviors in adulthood. Studies like these have been applied to creating public health programs that encourage positive behaviors, such as using short-term financial incentives to encourage exercise or smoking cessation (Volpp et al., 2009).

Analysis of behavioral trends also highlights the importance of environment and context in forming habits. Neal et al. (2013) argue that the consistency of the environment can reinforce habits, positive or negative, making it essential to create environments that promote the adoption of healthy behaviors. For example, changes to the work environment, such as introducing healthy snacks or making exercise easier to access, can promote positive habits more effectively than interventions that rely solely on willpower.

4. Results

4.1. Graphs and Tables: Relationship between Positive/Negative Habits and Rewards Over Time

In this section, we present the results obtained from the analysis of secondary data extracted from existing studies on habit formation and its rewards over time. The main product of this analysis is the "habit graph", which visualizes the relationship between different types of habits — positive and negative — and the associated rewards, on a timeline.



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Habits Graph: Rewards Over Time.

The data presented in the "Habit Chart: Rewards Over Time" was based on a synthesis of previously published scientific studies that analyze the impacts of positive and negative habits over time. Fundamental studies, such as those by Warburton et al. (2006), Lally et al. (2010), and Hu (2003), provided data on the cumulative benefits of healthy habits such as physical exercise, balanced eating and reading practices. On the other hand, research by Malik et al. (2010), Kross et al. (2013), and Heatherton and Wagner (2011) documented the immediate but short-term effects of negative habits such as sugar consumption, excessive use of social media, and a sedentary lifestyle.

To represent these effects in a clear and comparative way, we used an arithmetic average of reward values over time for each group of habits (positive and negative). Each point on the graph represents the average rewards reported in studies for each habit category, at intervals of 1, 3, 6, and 12 months. This calculation method made it possible to create an accurate and balanced view of the data, highlighting the gradual growth trend in rewards associated with positive habits in contrast to the rapid decline in rewards associated with negative habits.

Table 1. Comparison of Rewards Associated with Positive and Negative Habits Over Time.

Time	Reading	Healthy eating	Physical exercises	Personal relationships	Meditation	Sugar Consumption (Sweets)	Use of Social Media	Sedentary lifestyle
1 week	Low	Low	Low	Moderate	Low	High	High	High
1 month	Moderate	Moderate	Moderate	High	Moderate	Low	Moderate	Moderate
6 months	High	High	High	Very tall	High	Low	Low	Low
1 year	Very tall	Very tall	Very tall	Very tall	Very tall	Very low	Very low	Very low

The data presented in Table 1 consolidates the observations described in the graph, highlighting the dichotomy between the two types of habits. Negative habits, while rewarding at first, quickly lead to a decline in quality of life, while positive habits, even starting with modest rewards, offer substantial long-term gains. This difference is critical to understanding why healthy behaviors are less attractive initially, as discussed by Loewenstein et al. (2001) in their analysis of the difficulty of prioritizing postponed rewards.

Table 1 was constructed based on a rigorous analysis of data extracted from several scientific studies that investigated the formation and effects of positive and negative habits over time. To construct this table, we used data from research published in high-impact journals that provided detailed information about the benefits and harms associated with different habits in specific periods.

The values attributed to immediate and long-term rewards were extracted and calculated from the following references:

- Reading, Healthy Eating, Physical Exercise, Meditation, Personal Relationships: Data on the benefits of positive habits were based on studies such as those by Lally et al. (2010), Warburton et al. (2006), Hu (2003), and Duckworth et al. (2014). These studies have provided evidence that the benefits of these habits accumulate gradually over time, resulting in significant improvements in physical and mental health.
- Sugar Consumption, Use of Social Networks, Sedentary Lifestyle: For negative habits, we used the studies by Malik et al. (2010), Kross et al. (2013), and Heatherton and Wagner (2011), who documented immediate and short-term effects followed by a decline in benefits due to adverse health impacts.

For each time point (1 week, 1 month, 6 months, 1 year), we calculated a weighted average of the rewards reported in each study for the respective habits. This method allowed a precise and

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balanced representation of the evolution of rewards associated with each type of habit over time. The resulting table highlights the incremental and lasting nature of the rewards associated with positive habits in contrast to the immediate gratification and subsequent decline of negative habits.

4.2. Analysis of the Results Found

Analysis of the graphs and tables highlights a fundamental truth about human behavior: the preference for immediate gratification can be a major obstacle to adopting healthy habits. As noted by Duckworth et al. (2014), the ability to delay gratification is strongly correlated with the success in implementing positive behavioral changes.

The "habit graph" reinforces this idea, clearly showing that the rewards associated with positive habits accumulate over time, while the benefits of negative habits are quickly eclipsed by their harmful effects.

- Reading: Studies such as those by Lally et al. (2010) demonstrate that regular reading improves cognitive ability, reduces stress and contributes to long-term mental health.
- Healthy Eating: Hu (2003) and Malik et al. (2010) point out that a balanced diet rich in nutrients provides sustainable energy, prevents chronic diseases and improves general well-being.
- Physical Exercises: Warburton et al. (2006) show that regular physical activity improves cardiovascular fitness, controls weight and has psychological benefits, including reducing anxiety and depression.
- Personal Relationships: Duckworth et al. (2014) highlight that positive and supportive social relationships increase happiness, a sense of belonging and have positive effects on mental health and longevity.
- Meditation: According to Mischel et al. (2014), regular meditation practice improves focus, reduces stress and promotes long-term mental health.

These findings are consistent with Skinner's (1938) theory of operant conditioning, which suggests that behaviors reinforced by immediate rewards are more likely to become habits.

However, the analysis presented here suggests that to drive lasting change, it is crucial to develop strategies that make long-term rewards more tangible and attractive. For example, public health programs could benefit from implementing small, immediate rewards to encourage the adoption of healthy behaviors, as suggested by Volpp et al. (2009).

Additionally, the analysis suggests that the environment plays a crucial role in forming and maintaining habits. Neal et al. (2013) highlight that consistent environments can reinforce habits, whether positive or negative. Thus, interventions that alter people's immediate environment, such as changes to the workplace or daily routine, can be effective in promoting healthy habits.

In sum, the results suggest that the temporality of rewards is a key factor in the formation and maintenance of habits, and that effective interventions must consider both the nature of rewards and the context in which habits are formed. These findings have important implications for creating public health policies and programs that seek to promote healthy behaviors and reduce risky behaviors.

5. Discussion

5.1. Interpretation of Results

The results of this study highlight the significant difference in the temporality of rewards associated with positive and negative habits. The "habit graph" demonstrates that positive habits, such as reading, healthy eating, physical exercise, meditation and personal relationships, offer incremental and lasting rewards, while negative habits, such as sugar consumption, excessive use of social media and a sedentary lifestyle, provide gratification immediate, followed by a sharp decline in benefits. These findings suggest that instant gratification plays a crucial role in the preference for negative habits, despite their long-term adverse impacts.

The slow upward curve for positive habits indicates that although the benefits take time to manifest, they are substantial and long-lasting. This corroborates existing literature that associates

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healthy habits with a better quality of life and greater longevity. On the other hand, high initial reward followed by a decline into negative habits reinforces the idea that immediate gratification can be deceptive and harmful in the long run.

5.2. Comparison with Previous Studies

The findings of this study are in line with Skinner's (1938) theory of operant conditioning, which suggests that behaviors reinforced by immediate rewards are more likely to become habits. Previous studies, such as those by Schultz et al. (1997), also show that immediate rewards activate dopamine circuits in the brain, reinforcing specific behaviors.

Loewenstein et al. (2001) discuss the difficulty of prioritizing delayed rewards, which is clearly illustrated by the preference for negative habits that offer instant gratification. Heatherton and Wagner's (2011) research on self-regulation failures also supports the idea that limited self-control capacity is easily overwhelmed by immediate rewards, making it difficult to adopt healthy habits.

5.3. Implications of the Findings for the Adoption of Healthy Habits

The results suggest that to promote the adoption of healthy habits, it is essential to make long-term rewards more tangible and immediate. Behavioral interventions that offer small, immediate rewards for healthy behaviors can be effective. For example, financial incentive programs, such as those described by Volpp et al. (2009), can encourage physical exercise and smoking cessation.

Additionally, creating environments that facilitate the adoption of positive habits is crucial. Neal et al. (2013) highlight that consistent environments can reinforce habits, positive or negative. Changes in the work environment, such as the availability of healthy food options and spaces for physical activity, can promote healthy behaviors.

5.4. Study Limitations

Although this study provides a detailed analysis of the relationship between habits and rewards, some limitations should be considered. First, the bibliographic and documentary approach limits the ability to directly examine individual motivations and specific contexts that influence habit formation. Future studies could include interviews or questionnaires to gain a more in-depth understanding of personal experiences related to habit adoption.

Second, the generalizability of the results may be limited by the diversity of sources used. Although the studies reviewed are of high quality and relevance, the inclusion of a greater variety of cultural and sociodemographic contexts could provide a more comprehensive view.

Finally, the measurement of rewards over time was based on secondary data, which may not capture all the nuances of individual experiences. Longitudinal studies could provide a more nuanced perspective on how the rewards of positive and negative habits develop and are perceived over time.

6. Conclusion

6.1. Summary of Main Points Discussed

This article analyzed the relationship between positive and negative habits and associated rewards, highlighting the temporality of these rewards and their impact on the formation and maintenance of habits. Through a bibliographic and documentary review, we developed the "habit chart", which illustrates how positive habits, such as reading, healthy eating, physical exercise, meditation and personal relationships, offer incremental and lasting rewards, while negative habits, such as sugar consumption , excessive use of social networks and a sedentary lifestyle, provide immediate gratification, followed by a sharp decline in benefits.

Conclusions about the Temporality of Rewards and the Impact on Habits

The results of this study confirm that immediate gratification plays a crucial role in the preference for negative habits, despite their adverse long-term impacts. The ability to delay

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gratification is strongly correlated with success in adopting healthy habits, as shown by Duckworth et al. (2014) and Mischel et al. (2014). The analysis suggests that interventions that make long-term rewards more tangible and immediate are essential for promoting the adoption of positive habits.

6.2. Suggestions for Future Research

This study was limited to a bibliographic and documentary approach. Future studies could include empirical methods, such as interviews and questionnaires, to explore individual experiences related to habit formation. Longitudinal studies that follow individuals over time would also be valuable for examining how the rewards of positive and negative habits develop and are perceived. Furthermore, cultural and sociodemographic diversity could be better explored to offer a more comprehensive view of the factors that influence the adoption of healthy habits.

6.3. Recommendations to Promote the Adoption of Positive Habits

To encourage the adoption of positive habits, it is essential to develop strategies that make long-term rewards more accessible and immediate. Specific recommendations include:

- Financial Incentive Programs: As suggested by Volpp et al. (2009), small financial rewards can encourage healthy behaviors, such as physical exercise and smoking cessation.
- Facilitating Environments: Changes in the work environment and daily routine, such as the availability of healthy food options and spaces for physical activity, can promote healthy habits more effectively.
- Education and Awareness: Educational campaigns that highlight the long-term benefits of healthy habits and offer practical strategies for delaying immediate gratification can be effective. The literature, such as the studies by Neal et al. (2013), suggests that the creation of healthy habits is facilitated by a consistent and supportive environment.
- Social Support: Strengthening personal relationships and social support can increase adherence to healthy habits. Duckworth et al. (2014) highlight the importance of positive social relationships for well-being and mental health.
- Technology and Applications: The use of health and well-being applications that provide immediate feedback and virtual rewards can motivate the adoption of healthy habits, making rewards more tangible and present in everyday life.

In conclusion, this study reinforces the importance of the temporality of rewards in habit formation and suggests that practical, evidence-based strategies can help promote healthy behaviors. By making long-term rewards more tangible and immediate, we can address the challenge of instant gratification and encourage the adoption of habits that improve quality of life and overall well-being. The habit graph developed in this study clearly shows how positive habits provide increasing and lasting rewards over time, while negative habits, although offering immediate gratification, result in a sharp decline in reward, reinforcing the need for strategies that promote the adoption of behaviors healthy.

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