

Impact of study partner status and group membership on commitment device effectiveness among college students

Misha Gupta¹, Keana Richards²

¹ Dhirubhai Ambani International School, Mumbai, India

² University of Pennsylvania, Philadelphia, Pennsylvania

SUMMARY

Procrastination is a major problem among college students and solutions are urgently needed. This experiment explores the effectiveness of a soft commitment device, a contract taken up voluntarily by a person in order to accomplish their goals, as one possible solution for procrastination. If the commitment is broken, there are psychological consequences (e.g., disapproval or disappointment). We hypothesized that status as defined by educational level and group membership based on music taste of a person's study partner would affect how well they fulfilled their commitment. To test this hypothesis, we conducted an online experiment wherein 134 participants were randomly assigned study partners of different status (high-status or low-status) and group membership (in-group or out-group). To quantify the effectiveness of the commitment device, we asked them how much time they would commit to studying, had them share the goal with their study partner, and then measured whether they accomplished this goal. We found that status and group membership did not significantly affect the likelihood of college students achieving their committed goals, which may be attributed to how status and group membership were manipulated. We also found a trending but non-significant increase in a participant's committed study time when their study partner was of low-status. Overall, this experiment shows the potential of soft commitment devices that take advantage of social relationships to reduce procrastination in college students.

INTRODUCTION

Most humans are not rational decision makers across many domains. As shown by Kahneman and Tversky's research in the 1970s, humans are prone to various cognitive biases when making judgements (1). For instance, when offered the option between 100 dollars today or 105 dollars tomorrow, people tend to prefer receiving 100 dollars today. However, if asked to choose between 100 dollars 365 days from now and 105 dollars 366 days from now, they would likely choose the latter option. Laibson explains this irrational preference using the present-bias model, which predicts that people often seek instant gratification over long-term satisfaction (2, 3). Making

such choices is harmful because it reduces overall welfare, yet humans continue to make these choices because of their inherent present bias, which causes their preferences and choices to often be dynamic or time-inconsistent.

Procrastination, defined as "voluntarily delaying an intended course of action despite expecting to be worse off for the delay", is a consequence of these time-inconsistent preferences. College students may be especially susceptible to procrastination (4). In fact, a study found that between 80 and 95% of college students engage in procrastination (4).

There is a strong relationship between procrastination, stress, and anxiety, which can lead to performance and health-related consequences of procrastination (5). The tendency to procrastinate can result in the drop of academic performance and increased drop-out rates in the first year of college (6). Researchers have found that over 80% of students reported negative affect when asked about how they felt after procrastinating (7, 8). Sleep deprivation is often one of the results of procrastination, which can damage health and impair performance (9).

Since procrastination is especially prevalent among college students, it is important to explore interventions to combat procrastination within this population. Various studies also indicate that more than 60% of college students state that they want to reduce their procrastination (10, 11). One possible solution is to introduce college students to self-commitment devices, which are ways a person can restrict their choices until they accomplish a goal. Many studies have tested different commitment devices and their effectiveness in increasing productivity, especially in work settings. One type of commitment device – payment for work – is used most frequently in experiments on productivity. For instance, it was found that data entry workers respond with greater output when such commitment devices were enforced (12).

However, colleges cannot realistically pay students as an incentive to complete their assignments on time. Other studies simply use contracts which involve a punishment for not meeting a target. For example, Ariely and Wertenbroch carried out a field experiment on Massachusetts Institute of Technology students wherein the students had to write 3 short essays (13). Submitting a paper later than the announced deadline would cause a 1% reduction in the grade for each extra day beyond the deadline. One group was given evenly spaced fixed deadlines, and went on to achieve high grades.

However, such contracts would likely be hard to maintain, especially in a college setting, since students have to take responsibility of their own assignments and there is no one designated to enforce these punishments.

The above mentioned monetary and academic penalties can be categorized as 'hard' commitment devices. Hard commitment is binding and leads to real economic, physical or tangible penalties if broken. On the other hand, 'soft' commitment places no explicit restrictions on future behavior and leads to consequences that are primarily psychological. Since soft commitment devices do not put in place any definite restrictions, they are more acceptable to a wider range of consumers than hard commitment devices (14).

There has been some research showing that goal sharing can be an effective soft commitment device. One study showed that self-help peer groups, wherein participants had the option to publicly announce their savings commitment, increased savings (15). Similarly, another study showed that sharing a verbal or written commitment to adhere to a health behavior with another person caused a reduction in weight (16). We also have reason to believe that making a commitment to another person benefits goal pursuit because humans are social animals and others' perceptions matter to them (17).

Thus, for a more feasible, and perhaps more effective, commitment device for college students, we studied the effects of sharing one's goals and progress with another person (i.e., their "study partner") as a means of soft commitment.

The relationship with the person being committed to would determine the degree of impact of the commitment device. The two relationship-related dimensions we chose to test in this experiment were status and group membership. Starting with status, humans have been shown to be obedient in the presence of those they consider legitimate authority figures. In the classical sense, being obedient would mean doing what one is told to do. In this case, while the subject is not being told what to do, they are committing to someone with higher status. This might make the subject feel obligated to complete their stated tasks due to their lower status relative to the person they are making the commitment to. Two of the most well-known psychological studies from Milgram and Zimbardo show that people are willing to go to extreme lengths to obey authority (18, 19).

There are few lines of evidence showing that sharing goals with members of one's in-group, a social group they identify with, compared to sharing goals with members of one's out-group, a social group they do not identify with, is an effective commitment device (20). Group membership may be an effective way to improve commitment devices because a person driven by a need for social acceptance may behave differently when they commit to people from different groups. For example, people tend to show greater competition toward out-group members and greater cooperation toward in-group members (21). Both greater competition and a more cooperative attitude have the potential to allow people to

meet their commitments more successfully. Since social relationships are especially important during the college experience, group membership was another relevant dimension to explore in the experiment because it could improve the effectiveness of the commitment device (22).

In our experiment, we assigned participants study partners online with either low or high educational status and in or out-group membership based on music taste. Study partners having the same music taste as the participant were in-group and those having a different music taste were out-group. Participants then stated their studying goals to these partners, and their actual studying time was recorded. Our main hypothesis was that participants who shared their goals with a high-status person would be more likely to study because humans tend to want to please those of higher status. As for group membership, we didn't have any a priori hypothesis; the participants may have wanted to study more when having either an out-group member or an in-group member as a partner, as cooperation/competition could come into play in both cases. By manipulating these variables, we aimed to understand which type of study partner would help college students achieve their study goals more effectively.

RESULTS

Participants were randomly assigned to one of 5 conditions: In-group study partner with high status ($n = 26$), in-group study partner with low status ($n = 35$), out-group study partner with high status ($n = 34$), out-group study partner with low status ($n = 26$), and a control condition where they were not assigned a study partner ($n = 13$). Low status was defined as having obtained an education level of less than high school, while high status was defined as having a professional degree such as JD or MD. An in-group partner meant that they had the same preferred genre of music as the participant, whereas an out-group partner would have a different preferred genre.

Participants were told that their task was to proofread paragraphs and count errors and that they would receive a bonus based on the number of whole paragraphs completed correctly. Then, participants were asked to commit to a certain amount of studying time before the task, with a maximum time of 8 minutes, which they were told would be shared with their study partners. We collected this committed study time and later measured the actual time each participant spent studying, where they were given sample tasks to complete. The average committed study time was 4.35 minutes and the average actual study time was 5.40 minutes.

We first examined the extent to which status and group membership predicted the difference between committed and actual study time, wherein the committed study time was subtracted from the actual study time, through a multiple linear regression. We regressed the difference between committed and actual study time on status and group membership.

We found that relative to high-status, participants who were assigned a low-status partner showed an increased difference

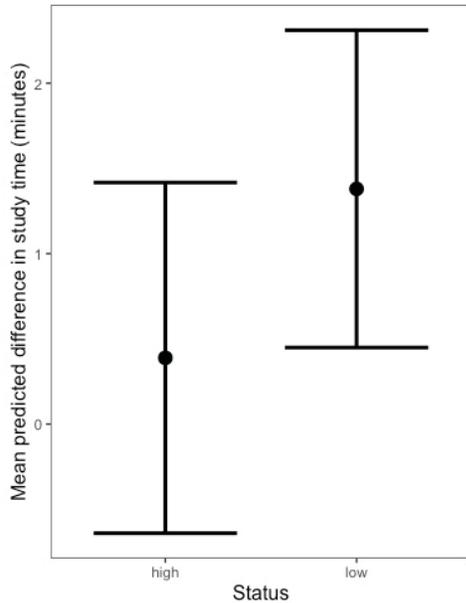


Figure 1: Mean predicted study time difference for high and low status. The study time difference, which is found by subtracting the committed study time from the actual study time, was measured for participants with high-status ($n = 60$) and low-status ($n = 61$) study partners. A multiple linear regression was performed. The graph plots predicted values based on the model (study time difference ~ status of study partner + group membership of study partner), while controlling for group membership. The error bars represent 95% CI.

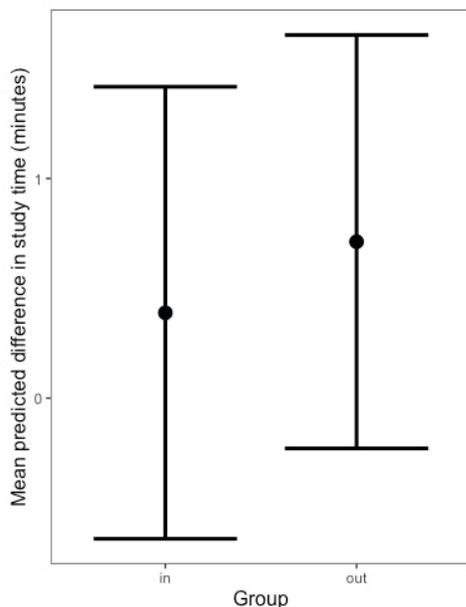


Figure 2: Mean predicted study time difference for in-group and out-group. The study time difference, which is found by subtracting the committed study time from the actual study time, was measured for participants with in-group ($n = 61$) and out-group ($n = 60$) study partners. A multiple linear regression was performed. The graph plots predicted values based on the model (study time difference ~ status of study partner + group membership of study partner), while controlling for status. The error bars represent 95% CI.

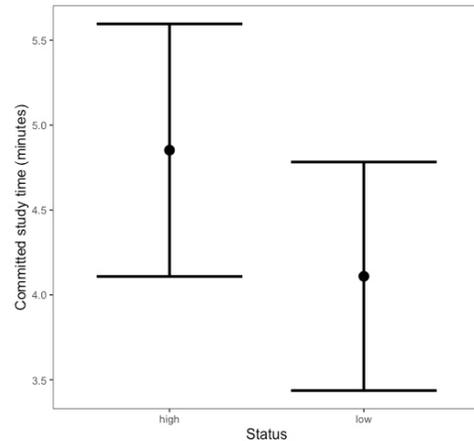


Figure 3: Difference in committed study time based on status of study partner. The committed study time was measured for participants with high-status ($n = 60$) and low-status ($n = 61$) study partners. A multiple linear regression was performed. The graph plots predicted values based on the model (committed study time ~ status of study partner + group membership of study partner), while controlling for group membership. The error bars represent 95% CI.

between committed and actual study time (Figure 1). However, the effect was not statistically significant, giving no evidence that status considerably affects the effectiveness of the commitment device ($\beta = 0.99$, 95% CI [-0.15, 2.13], $t(118) = 1.72$, $p = 0.09$). Similarly, relative to the out-group, participants who were assigned an in-group study partner showed an increased difference between committed and actual study time than the out-group (Figure 2). Again, the effect of group membership on the difference was not statistically significant, so we do not have evidence that group membership considerably affects the effectiveness of the commitment device ($\beta = 0.32$, 95% CI [-0.82, 1.46], $t(118) = 0.56$, $p = 0.575$).

On top of our hypothesized main effects, we explored whether status and group membership affected committed study time, as it could show how goal-setting changes depending on the person being committed to and shed light on how people want to be perceived based on the status and group membership of their study partners.

To this end, we ran a multiple linear regression with study partner status predicting committed study time. There was a trending but non-significant increase in committed study time in participants who had a low-status study partner when compared to a high-status study partner ($\beta = -0.74$, 95% CI [-1.57, 0.08], $t(118) = -1.79$, $p = 0.077$) (Figure 3). Likewise, participants committed less time to studying in the condition where they had a study partner from their in-group relative to the condition where they had a study partner from their out-group. However, this effect was not significant ($\beta = -0.26$, 95% CI [-1.08, 0.57], $t(118) = -0.62$, $p = 0.538$) (Figure 4).

We also investigated the effect of participant age on committed study time and performance on the task. We did not find a significant effect of age on committed study time

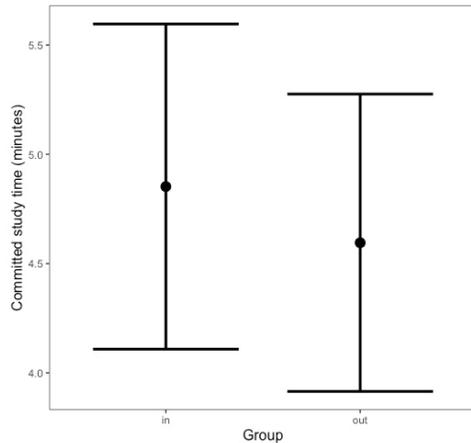


Figure 4: Difference in committed study time based on group membership of study partner. The committed study time was measured for participants with in-group ($n = 61$) and out-group ($n = 60$) study partners. A multiple linear regression was performed. The graph plots predicted values based on the model (committed study time \sim status of study partner + group membership of study partner), while controlling for status. The error bars represent 95% CI.

($\beta = 0.00004$, $p = 0.999$). We also found that age does not predict the participant's performance in either the practice task ($\beta = -0.02$, $p = 0.27$) or the real task ($\beta = -0.02$, $p = 0.16$).

We then analyzed whether the condition participants were assigned to predicted accuracy on the manipulation check to see whether the conditions were differentially memorable. If participants in one condition remember the status or group membership of their study partner more than others, it would suggest that there is an alternative explanation for our results and the manipulation may have been ineffective.

We fit two logistic regressions (estimated using Maximum Likelihood Estimation) to predict the accuracy of the

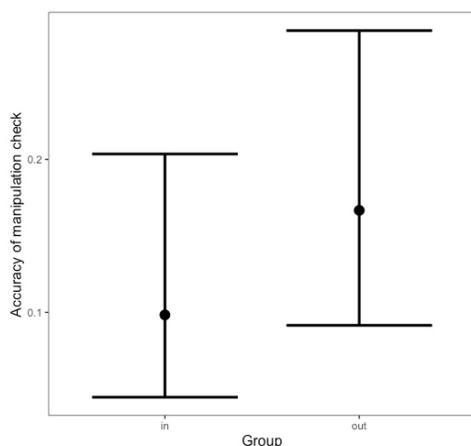


Figure 5: Accuracy of manipulation check for group membership of study partner. The graph plots the predicted percentage of participants with in-group ($n = 61$) and out-group ($n = 60$) study partners correctly answering the manipulation check for group membership. A logistic regression was performed. Values were based on a model (manipulation check 1 accuracy \sim group membership of study partner). The error bars represent 95% CI.

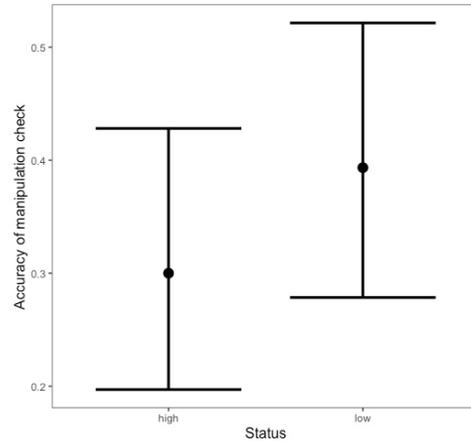


Figure 6: Accuracy of manipulation check for status of study partner. The graph plots the predicted percentage of participants with high-status ($n = 60$) and low-status ($n = 61$) study partners correctly answering the manipulation check for status. A logistic regression was performed. Values were based on a model (manipulation check 2 accuracy \sim status of study partner). The error bars represent 95% CI.

participant's answer to the first and second manipulation checks, respectively. The first manipulation check tested how well the participants remembered the group membership of the study partner, while the second manipulation check tested how well participants remembered the status of their study partner.

In all, 13.22% of participants answered the group membership manipulation check question incorrectly, with participants in the out-group condition being more likely to incorrectly answer (Figure 5). However, the effect of the predictor was not significant ($\beta = 0.61$, 95% CI [-0.46, 1.75], $p = 0.272$).

On the other hand, we found that 34.71% of participants answered the status manipulation check question incorrectly, with participants in the low status condition more likely to answer incorrectly (Figure 6). However, the effect of the predictor was not significant ($\beta = 0.41$, 95% CI [-0.34, 1.18], $p = 0.281$). Thus, it is unlikely that our null results for status and group membership were explained by one condition being more memorable than the other.

DISCUSSION

Overall, this experiment showed that the status of a study partner does not reliably predict the difference in committed and actual study time in our sample of college students. The group membership of the study partner with whom goals have been shared has no significant effect on the difference in study time either. The reason for this null effect is not due to one condition being more memorable than the other, as shown by the manipulation checks. Instead, it could be due to the ineffectiveness of the manipulations or the lack of an effect of status and group membership on effectiveness of commitment devices. Another consideration is that college students may not react the same way to differences in class

standing as they would to stark differences in education level. The manipulation of status would likely be weaker in a natural setting and may reduce the effectiveness of the commitment device.

The sample of participants also had a very large age range (62 years), meaning that the decisions made by the participants may not accurately reflect the decisions of college students. The human brain develops up to the mid-20s, so college students (who tend to be, on average, between 18 and 22 years of age) are likely to make more irrational decisions than older adults (23). Therefore, future research should explore this effect among college students within that age range. The age range may have been different from the typical college student population because it is difficult to verify the personal information MTurk workers provide, which may have allowed non-students to participate in the study.

Next, we found that college students commit to studying more when their study partner is of lower status. In college, class standing often dictates a student's relative status (24). So, if a college freshman and senior were study partners, the senior would likely commit to studying for more time than the freshman would. It could thus be helpful for students to seek out study partners from the years below them, so that they can push themselves with the goals they set. However, it is important to acknowledge that the manipulation of status in this study may have a different effect than a real-life status manipulation through class standing. This is something that can be explored in further research. Also, it will only be helpful if the actual study time increases along with the committed study time, something that was not supported by our research. Overall, this is an unexpected finding because one would think that a person of lower status would be more likely to want to prove themselves in front of a higher status person and not the opposite. Perhaps, higher status people commit to more when sharing goals with lower status individuals because they want to serve as a role model for them or because they feel the need to justify their status. This is something that should be investigated in future research.

Another factor that could be explored in future research is gender and how it plays a role in the effectiveness of commitment devices. Research shows that interactions with the opposite gender have the potential to yield social rewards such as the acquisition of romantic or sexual partners that same-gender interactions cannot for heterosexual individuals (25). Therefore, gender could be used to strengthen the commitment device we explored here.

Furthermore, we recommend that future studies investigating psychological commitment devices try to replicate these effects through in-person experiments. The manipulations of status and group membership may not be strong enough in an online experiment, especially when there is very limited information that can be conveyed to the participants about their study partner. In a real-life setting, the commitment device can be tested in the environment it is intended to be used in, making it a more valid test of our

hypotheses. Additionally, recruiting on Amazon Mechanical Turk (MTurk) presents its own set of unique challenges, where the platform may have inattentive workers, workers who enter the studies multiple times, and/or automated bots (26). Thus, data quality is a concern. When using MTurk, it is useful to address this concern through data quality checks like we did.

Overall, it is important to conduct research into commitment devices and other potential solutions to procrastination, which is a serious problem among college students (4). As the demand for commitment devices is quite high among college students as suggested by their desire to change their behavior, investigating novel commitment devices is essential (27). Taking advantage of social networks, specifically, in creating commitment devices is an easy, low-cost way to increase people's ability to accomplish their goals – especially during a time in life where social connections are especially important (22).

Although our study did not show that status and group membership were effective in increasing the utility of soft commitment devices when explored online, it was a first step towards this goal. We encourage future research to build on the initial insights into this phenomenon we provide through the current study, so we can understand whether status and group membership can make commitment devices even more effective.

MATERIALS AND METHODS

We recruited participants for the study via the platform MTurk in May 2021. Those who opted into the study had to pass a few screening questions that asked whether they were students and what their class standing was. If workers were not undergraduate college students, they were screened out of the study and were paid \$0.10 for their time. Additionally, upon reviewing the data, we had reason to suspect that some participants completed the study more than once. Specifically, some participants had the same MTurk ID. When a MTurk ID was repeated, only the first entry was included, and all subsequent entries excluded. After screening and exclusions, the final sample consisted of 134 participants with an average age of 25.18 ($SD = 7.35$, range = 62) years. In total, 13.45% of the participants who began the study passed the screening questions and were included in the analysis.

After agreeing to the consent form, participants were told they would be completing a three-minute paid task. The task involved counting the number of spelling errors in the 200–300-word article extracts provided. Participants in each condition were then shown the following text:

“Before you start the paid task, you have the opportunity to study by completing questions similar to those in the paid task for a maximum of 8 minutes. This will allow you to improve your accuracy and speed on the task. Practicing for the task will likely improve your performance and help you earn more! You will also be assigned a study partner who will complete the task simultaneously. Since having someone keep you accountable may be especially motivating while

studying, you and your study partner will be able to share your studying goals with each other. Before we start studying, let's get to know your study partner better! (Note: The study time is optional and will not count towards your payment.)”

To examine the effects of status and group membership on the effectiveness of using soft commitment devices, we told participants they would have the opportunity to study with a study partner as shown above. We gave them the opportunity to earn more money to motivate them to study and explained the importance of the study partner. Finally, participants were told that they would get to know their study partners. This allowed us to introduce the manipulations to status and group membership. Participants were randomly assigned to one of 5 conditions: In-group study partner with high status ($n = 26$), in-group study partner with low status ($n = 35$), out-group study partner with high status ($n = 34$), out-group study partner with low status ($n = 26$), and control ($n = 13$).

Participants assigned to the control condition were not given a study partner. Their introductory message was the same as the other conditions, except it did not include anything about study partners. The rest of the participants were also asked questions about their highest level of education and preferred genre of music to supposedly convey to their assigned study partner, who was set up to have the characteristics of the condition that the participant had been assigned.

The status of the study partner was manipulated by assigning them a *high* (Professional degree) or *low* (Less than high school degree) level of education. The participant had to choose between the music genres of hip-hop and rock in a multiple-choice question. The group membership of the study partner was then manipulated by assigning them a preferred genre of music that was the same as or different from the preferred genre of music of the participant. Having the same genre of music would mean that the study partner was in the participant's *in-group*, while having a different genre would mean the study partner was in the participant's *out-group*. For example, if the participant had an in-group high-status study partner, their study partner would have picked the same genre of music as the participant to reflect in-group and would have a professional degree to reflect high-status.

After learning about their study partner, all participants (excluding those in the control condition) indicated how much time, between 0 and 8 minutes, they would like to commit to practicing or “studying” before the paid task on a continuous slider. The slider allowed for 0.1-minute increments and increased to a maximum of 8 minutes of study time wherein they could perform problems similar to the paid task. This maximum amount of study time was chosen such that it allowed our study to have good statistical power with our given budget. At any point during the 8 minutes, participants could move on to the main task. We measured how long each participant studied during the studying period. Using this measurement of the actual study time and the previous measurement of the committed study time, we calculated

the difference between committed and actual study time. A positive or zero value on this metric indicates that the commitment device was successful because the participant met or exceeded their own study goal.

The main task was 3 minutes long and had the same type of questions as the practice, the only difference being the article extracts used and the opportunity to earn a bonus of \$0.05 for each correct paragraph completed. After completing the paid task, participants were told their score and completed a manipulation check wherein they were asked about details concerning their study partner. Specifically, they were asked “Which was your study partner's favorite genre of music?” and “What is the highest level of school completed or the highest degree received by your study partner?” These were multiple choice questions. This was done to determine how memorable our manipulations of status and group membership were, respectively. Finally, participants were shown a debriefing form and received their payment code. Those who completed the study were paid \$1.50 in addition to any bonuses earned in the study. This rate is within the normal range for MTurk.

Using R statistical software, we carried out a regression analysis with status and group membership as the predictor variables and difference between committed and actual study time as the outcome variable (study time difference \sim status + group membership). We used a regression analysis because it allowed us to add in control variables and compare how control variables affect the original model. We also explored the effects of our predictors on other outcome variables. In a separate logistic regression analysis, we predicted the accuracy of the participants' answers to the manipulation checks. All tests of $p < 0.05$ were considered significant.

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