Group and Cultural Influences on Household Survey Response Rate

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Abstract
Using the REACH U.S. (Racial and Ethnic Approaches to Community Health Across the U.S.) Survey as a case study, we have demonstrated that, in a household survey with at most two members selected, there is a big drop from household- to member-level cooperation rates. Further analysis shows such discrepancy is due to drops from second- to first- and to only-member cooperation rates, which we believe are influenced by two factors. The first one, call Screener Provider Effect, is a bias due to confounding. The second one takes place when selected members of a household define a single completed interview by another selected member as their own completed interview. Our discussion focuses on future areas of research suggested by our novel findings and ways to enhance member-level cooperation rates in surveys where multiple members of a household are selected.

Key Words: Diminishing Cooperation, Screener Provider Effect, Collectivism/Individualism, REACH U.S.

1. Survey and Data Overview

Our project began with an intriguing observation on the discrepancy between the household-level and member-level response rates in the Racial and Ethnic Approaches to Community Health Across the U.S. (REACH U.S.) Survey, a community-based participatory research project on health disparity elimination. Before we present such phenomenon of interest, we first introduce the survey, describe what data were actually chosen for analysis, and explain the reasons behind our choice.

In 2009, REACH U.S. conducted an annual survey in 28 possibly overlapping local communities among 40 potential grantees, with each studying one or more racial/ethnic groups in a local area. It primarily uses a two-stage address-based sampling (ABS) design with a residential address frame, and possibly an extra list frame when the target population is rare or has age-targeted oversampling requirement. Certain communities went through design changes in the later phase of the survey. But the majority of the housing units were selected in the first stage through either unstratified or stratified sample random sampling. In the second stage, respondents were recruited by calling if the household could be reliably matched to a working residential numbers, or by mailing self-administrated questionnaires otherwise. After the address was confirmed and its household was rostered, up to two non-age-targeted eligibles were randomly selected. All age-targeted eligibles were selected regardless of how many others had already been selected. There was no formal third stage of sampling besides a small portion of refusals subsampled for field follow-up. Moreover, cases with mailing addresses that did not uniquely identify the physical locations of the housing units, such as drop points, were sent directly to the field.

REACH U.S. collected probability samples in all communities. But since our primary goal is to study cooperation behavior in our phenomenon of interest rather than making any estimate of the population, we will treat the data (or, rather, the *para*data) as if they were nonprobability samples collected for a typical psychological experiment. A blanket weight

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adjustment would make the the results hard to interpret because the communities have different mixes of interview modes, geographic overlapping, and design changes. Moreover, they have drastically different weights due to different population sizes, and stratification and oversampling requirements. With weighting, combining surveys that are too different would undesirably increase the overall design effect. Therefore, we will use the paradata in the context of a *pseudoexperiment*, and will not weight the cooperation rates.

To compensate, we will consider only the communities that have no oversampling or stratification requirements in their primary sampling designs. To further ensure the validity of our qualitative comparisons, we will consider only the communities that target at least Hispanic/Latinos or African Americans. A *Hispanic* (or *black*) *household* is defined as a household with at least one Hispanic (or African American) adult, who is not necessarily selected or even eligible for the survey. A household is both Hispanic and black if it has at least one Hispanic adult and at least one African American adult (not necessarily selected or eligible). Although some Hispanic- and black-targeted communities also look for other races/ethnicities, it just so happens that the vast majority of rostered household members in such communities are Hispanic or African American. Therefore, our analysis will ignore any influence from other races/ethnicities on our target populations.

The last step of our model simplification is to consider only the telephone mode of interview. It is not only the dominant mode with the most cases available for analysis, but also the most *personal* mode in the sense that a telephone respondent is least likely to have other respondents involved in the conversation during the interview. This is important because, in our analysis to follow, we need to have some confidence that the decision to cooperate is primarily due to the cultural predisposition of the selected respondent rather than the result of a discussion with other household members. In this light, a *selected household* refers to specifically the household with at least one member selected for a telephone interview; and the quantifiers 1-*selected* and 2-*selected* clarify how many eligibles were selected.

Five geographically disjoint neighborhoods communities turn out to meet our criteria. They are from multiple Census regions in the U.S., and cover 6,547 households and 11,099 members in the telephone mode.

2. Cooperation Rate Discrepancy

Our key measure is a specific form of response rate, referred to as COOP1 by AAPOR (2008). This is a *minimum cooperation rate* in the sense that it counts only the proportion of eligible respondents who actually completed the entire interviews. To eliminate factors irrelevant to respondents' willingness to cooperate, the rest of our paper will consider only this particular variant in favor of other broader definitions, and will refer to it simply as COOP (cooperation rate). Household cooperation is defined as the completion of telephone interview by any selected member in the household.

Figure 1 shows that the household-level cooperation rates for all 5 communities are decently high at about 60% (solid line), but the member-level cooperation rates all drop to about 40% (dashed line with direction indicated by red, downward arrow). This is a big drop. If success at the household level does not translate to success at the member level, which is what really matters for the survey, then it is important to understand why this phenomenon happens and what can be done about it.

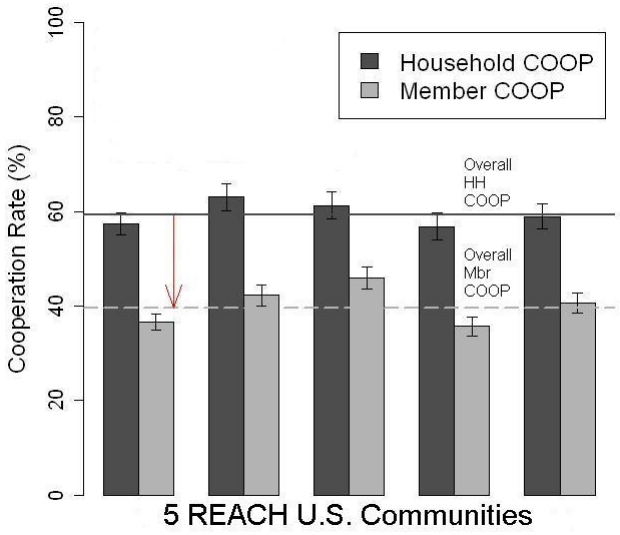

Figure 1: Discrepancy in Cooperation Rates among 5 REACH U.S. Communities.

We will refer to the first (or second) selected respondent who completed a telephone interview the *first* (or *second*) *member*. When the household has only one member selected, the first member is sometimes called the *only member*. We note that the household-level cooperation rate would have been equal or close to its member-level counterpart should the first and second members cooperate at the same or similar rates. The presence of a big discrepancy is evidence that the first and second members have drastically different cooperation behaviors even though they live in the same households. In the remaining section, we will clarify how the two rates differ.

By the theory developed in the Appendix, the maximum likelihood estimates for the first-member cooperation rate ($\hat{p}_1$) and for the second-member cooperation rate ($\hat{p}_2$) are

$$\hat{p}_1 = \frac{\text{number of households with exactly 2 members selected and at least 1 responded}}{\text{number of households with exactly 2 members selected}} ,$$

$$\hat{p}_2 = \frac{\text{number of households with exactly 2 members selected and responded}}{\text{number of households with exactly 2 members selected and at least 1 responded}} .$$

From Table 1, the estimates are calculated to be

$$\hat{p}_1 = \frac{2637}{4552} = 57.9\% \qquad \text{and} \qquad \hat{p}_2 = \frac{517}{2637} = 19.6\% .$$

Comparing $\hat{p}_1$ with the only-member cooperation rate 62.2% (calculations not shown), we can see that the cooperation behaviors of the first members are very similar regardless of whether an extra member was selected. It is the second members who accounted for most of the rate discrepancy.

We can compute the same measures for each community. Without showing the details, we summarize the results in Figure 2. All rates are similar, except that one community (in the middle of the 5 groups) has a significantly higher second-member cooperation rate. (That community has a higher density of African Americans and, by our theory to be developed in Section 4, is supposed to have a higher second-member cooperation rate.) In any case, the most important pattern remains clear: the second-member cooperation rate is about 40% lower than the first- or only-member cooperation rates in every community.

Type of 2-selected HH	*Frequency of Each Type*	*Cumulative Frequency*
2 completes	517	$x_2 = 517$
1 complete	2120	$x_1 = 2637$
0 complete	1915	$x_0 = 4552$

Table 1: Distribution of 2-selected Households for the 5 REACH U.S. Communities

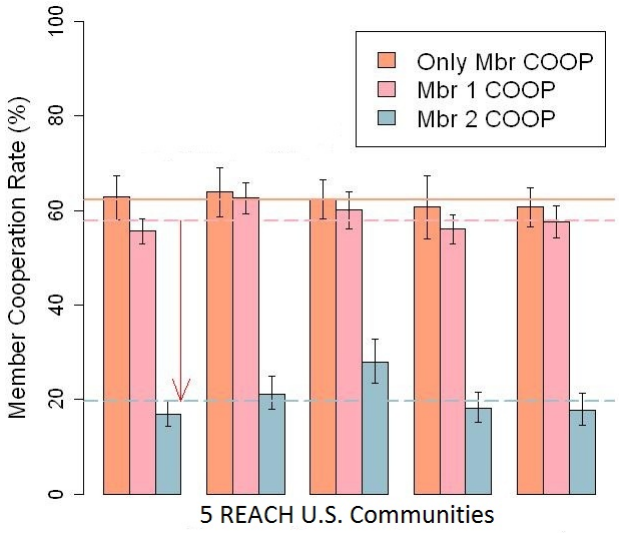

Figure 2: Cooperation Rates by Member Type and Community.

From now on, we will assume that geographic variability is negligible, and will analyze them as one group.

We will study two factors believed to contribute to the cooperation rate discrepancies.

3. Screener Provider Effect

The first factor seeks to explain whether the first members somehow were more cooperative, holding other household members as the norm.

Recall that REACH U.S. has a screener, which requires the cooperation from at least one of the household members to complete. We call such person(s) the *screener provider(s)*. Such screener providers are not necessarily selected or even eligible for the survey. But, in practice, they are usually selected *and* are solicited for interview on the same call right after screener completion. Since the screener providers had already cooperated with the interviewers on the household roster, it is not unreasonable to speculate that they would likely cooperate once more on the main questionnaire. As a result, the screener providers should have a much higher chance of becoming the first members to complete the interviews.

Furthermore, if a household has no one to provide the roster, it has no chance of being selected. By our choice of cooperation rate definition, such cases are excluded from the denominator. As a result, if the norm is for people (*i.e.*, the second members) to refuse, then most of the completes will come from the screener providers (and, ultimately, the

first members). The household-level cooperation rate becomes highly correlated with the screener-provider cooperation rate (and, ultimately, the first-member cooperation rate). In that case, the household-level cooperation rate overestimates the member-level counterpart because household cooperation is confounded with screener provider cooperation. This is a form of volunteer bias. And we will call it the *screener provider effect*.[1]

Our first evidence of screener provider effect is summarized in Figure 3 below, which

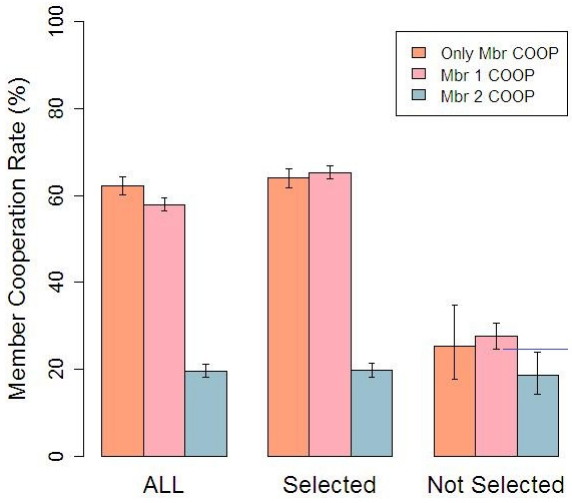

Figure 3: Cooperation Rates by Screener Provider's Selection Status.

breaks down the overall sample (leftmost group) into two scenarios according as whether screener provider was actually selected for main interview (middle group) or not (rightmost group). When screener providers were selected, the cooperation rate discrepancy between first and second members still exists and is virtually identical to the overall scenario. When screener providers were not selected, the only- and first-member cooperation rates were greatly reduced to similar level as the second members. From this we may confirm the presence of screener provider effect.

With that said, the discrepancy between first and second members is still marginally significant (as indicated by the blue horizontal line) even after controlling for screener provider selection. This suggests that screener provider effect alone does not account for the entire cooperation rate discrepancy, and motivates us to consider a second factor.

4. Group and Cultural Influences

The second factor seeks to explain whether the second members somehow were more uncooperative, holding the first members as the norm. In particular, we hypothesize that

> (∗) the second-member cooperation rate decreased because the second members tended to perceive the household as such a unified group that the first member respondent, in effect, had completed the interview on behalf of other household members.

In other words, the second members took comfort in the thought that the first member had already fulfilled any obligation to participate *on behalf of* the rest. For example, when a

[1]This phenomenon must be well known because quite a few reviewers immediately pointed this out during our internal review at NORC. However, we have not been able to find any reference on this topic.

husband is asked to participate in a survey that he does not see as a personal matter, he may think, "My wife did it, which is as good as me doing it." As a result, the second members deviated from the norm of cooperation should they have been in the first position.

One of the best ways to test our hypothesis is to directly ask the nonresponding second members for their reasons of refusal. Unfortunately, no such nonresponse follow-up took place in the actual survey. The next best solution, we contend, is to categorize people by their propensity to fulfill our main hypothesis ($*$). Towards that goal, we introduce the concepts of *individualism* and *collectivism*, which are "cultural syndromes," namely, central themes on social norms and behavior patterns, distinguished by how the society members perceive their relationship with other society members. We can think of individualism as cars moving on a highway while keeping a distance from other cars. Using car as a metaphor for a person's private space, we can see that car passengers do not seek to relate the consequence of their actions *inside* their cars to people and events on other cars. Analogously, we can use ferry as a metaphor for public space, and can think of collectivism as people riding on a ferry. As passengers share a large, common space, they can identify the immediate consequence of one's action and, hence, will naturally emphasize interdependence. Table 2 provides more hints to distinguish the two cultural patterns.

	Individualistic	*Collectivistic*
My identity is defined by...	My traits and goals	My connection with others
What's important is...	Me	We
	My personal achievements	Our goals and solidarity
	My rights and liberties as an individual	Our social responsibilities and relationships as group members
I disapprove of...	Conformity	Egotism
My motto is...	"TO THINE OWN SELF BE TRUE."	"NO ONE IS AN ISLAND."

Table 2: Comparisons between Individualism and Collectivism

Members of individualism cultures tend to perceive loose connection among society members (themselves included). Their ingroups tend to be small, numerous, and independent of one another. In contrast, members of collectivistic cultures tend to perceive tight connections to a few larger ingroups and value highly on interdependence. Individualism does not necessarily imply liberalism or selfishness; whereas collectivism does not necessarily mean solidarity or even being submissive. Individualism/collectivism is the trait of a social pattern, not of an individual. Individuals who tend to identify with individualistic values are *idiocentric*; whereas those who tend to identify with collectivistic values are *allocentric*. No society displays *only* individualistic or collectivistic cultural patterns. And no individual acts and thinks idiocentrically or allocentrically under all circumstances at all time. The distinction between individualism and collectivism is a matter of degree, and may involve more dimensions beyond the looseness/tightness dichotomy.

Although individualism/collectivism applies to a household as well as a society, we cannot study its effect directly because our observations from REACH U.S. are based on paradata collected during the survey operation. Unlike an experiment which carefully prepares questions in advance to map out a person's individualistic/collectivistic tendency, our observational study was not designed to provide the needed details. Therefore, we will

study indirectly and use race/ethnicity as a *proxy indicator* of individualism/collectivism. In particular, we use the well-established result that Latin American cultures (Holtzman *et al.* 1975) as well as U.S. Hispanic cultures (Triandis *et al.* 1984) tend to be collectivistic. It is also well-known that the U.S. culture (Bellah *et al.* 1985) is highly individualistic. Since the African American culture has largely been assimilated as a major part of U.S. culture, we will treat it as individualistic as well.

The upshot of such psychological distinction is that members of individualistic cultures are less likely to depend on other people, and, hence, would have higher second-member cooperation rates. In comparison, members of collectivistic cultures are more likely to justify their nonparticipation as interdependence on other household members. Thus, we can examine the behavior of Hispanic household members, knowing their culture is collectivistic and more likely to satisfy hypothesis ($*$), to see if their cooperation patterns are consistent with the prediction of lower second-member cooperation rate. Similarly, we look at African American household members, knowing they are part of individualistic cultures and are less likely to satisfy ($*$), to see if their cooperation patterns entail higher rates.

When screener providers were selected, different types of households by race/ethnicity display similar distributions (Figure 4). The dramatic drop from first- to second-member

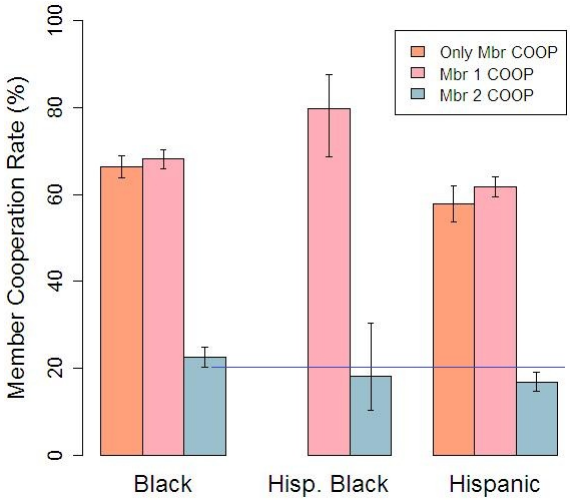

Figure 4: Cooperation Rate by Household Race/Ethnicity: Screener Provider Selected.

cooperation rates still exists, and is further evidence of screener provider effect (even when controlled for household race/ethnicities). The main message from this diagram is that black households have significantly higher second-member cooperation rates than Hispanic households (as indicated by the blue horizontal line). Also, the Hispanic black households were supposed to be a transition between Hispanic and black households. But due to the lack of data, no reliable conclusion can be drawn from such group.

When screener providers were not selected, we have a lot fewer cases and, hence, noticeably longer error bars (Figure 5). But the main patterns are still clear: the dramatic drop in cooperation rate once again disappears, and all household types have similar distributions. The second-member cooperations are no longer significantly different (as indicated by the longer, blue horizontal line). But the difference between first- and second-member cooperation rates for Hispanic households is now marginally significant (as indicated by the shorter, red horizontal line). This is consistent with our hypothesis that members from

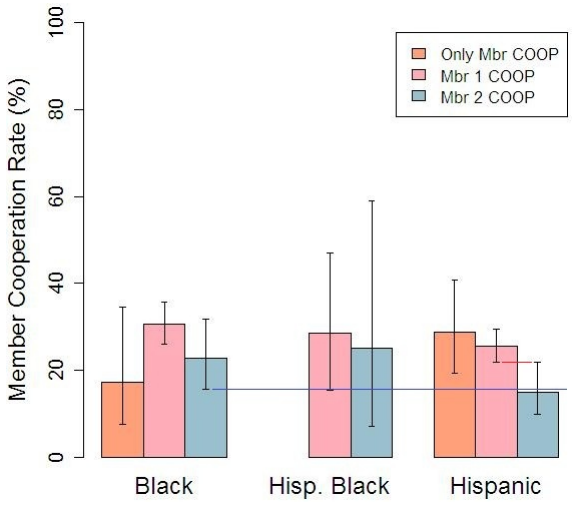

Figure 5: Cooperation Rate by Household Race/Ethnicity: Screener Provider Not Selected.

the collectivistic Hispanic households are more easily influenced by other household members than members from the individualistic black households.

All in all, our observations on the proxy groups of individualism/collectivism are consistent with our main hypothesis ($*$).

5. Conclusions and Outlook

Actual survey data show that the second household members cooperate at 40 percentage points below the first members, and thereby skew down the member-level cooperation rate by 20 percentage points with respect to household-level. Screener provider effect plays a major role, but does not explain the entire discrepancy. We attribute the rest to collectivistic thinking, and have used race/ethnicity as a proxy indicator of cultural predisposition (individualism/collectivism) to indirectly study the effect. Although we have gathered some suggestive evidences to support our hypothesis, we have left many factors well-known to favor collectivism, such as old age (Norick *et al.* 1987), lower social class and the female sex (Daab 1991), unexplored due to lack of data. To establish Hispanicity as a viable proxy indicator, we need to justify its link to collectivism. One theory (Todd 1987) suggests that, since Hispanics tend to live in large families, and since growing up in a tight group tend to cultivate collectivistic values in one's upbringing, Hispanic households tend to display more collectivistic patterns. The flip side of this theory gives a plausible justification to modeling blacks as individualistic, because they tend to live in small households. However, it is not clear whether collectivistic values cause the family sizes to grow, or living in large families causes collectivism to cultivate, or other causal relationships are involved. Here we do not make any causal claim, and have presented evidences to demonstrate only the association between the indicators and the phenomenon. Without analyzing deeper into household composition and its dynamics on attitude formation, our study is necessarily inconclusive. We acknowledge the shortcoming of such crude and indirect approach, and hope our study can open the doors to more rigorous studies on the topics.

On the application side, we believe psychology can provide a framework for systematically handling diminishing cooperation in household surveys. If large or, more generally, collectivistic households do tend to have lower cooperation beyond the first members, then

we should carefully consider the cost efficiency of interviewing multiple members and be prepared to cope with its consequence. According to one study (Foa, Foa 1974), people from individualistic cultures tend to exchange "universalistic" items, such as money, goods, and information; whereas people from collectivistic cultures tend to exchange "particularistic" items, such as love, status, and services. This means that, if we have an effective way of estimating the individualistic/collectivistic tendency of the prospective households, then we can potentially tailor more effective incentives to the prospective respondents. For example, perhaps we can offer cash to the individualists and coupons to the collectivists. Hopefully, as we gain deeper understandings into the cause of diminishing cooperation, more useful applications can be developed.

Appendix

Let X_0 be the number of households selected regardless of whether any selected household member cooperated. For $i = 1, 2$, let X_i be the number of households in which the "i^{th} member" completed the telephone interview. Again, i is an interview completion order assuming no tie; it is not a position in the household roster. In other words, X_i (for $i = 0, 1, 2$) denotes the number of households with at least i selected members cooperated to complete the telephone interviews. Let p_i be the probability that the i-th member cooperated for $i = 1, 2$ such that, at positive integers $X_0 = x_0$ and $X_1 = x_1$ satisfying $x_0 \geq x_1$,

$$X_1 \mid X_0 \sim \text{Binomial}(x_0, p_1) \quad \text{and} \quad X_2 \mid X_1 \sim \text{Binomial}(x_1, p_2)\ .$$

Furthermore, for realizations at nonnegative integer $X_2 = x_2$ such that $x_0 \geq x_1 \geq x_2 \geq 0$, the joint likelihood function becomes

$$L(p_1, p_2 \mid x_0, x_1, x_2) = \underbrace{\binom{x_0}{x_1} p_1^{x_1}(1-p_1)^{x_0-x_1}}_{\substack{x_1 \text{ out of } x_0 \text{ households} \\ \text{have 1}^{\text{st}} \text{ member responded}}} \times \underbrace{\binom{x_1}{x_2} p_2^{x_2}(1-p_2)^{x_1-x_2}}_{\substack{x_2 \text{ out of } x_1 \text{ households} \\ \text{have 2}^{\text{nd}} \text{ member responded}}}$$

and its log-likelihood becomes

$$\begin{aligned}\ell(p_1, p_2 \mid x_0, x_1, x_2) = \text{constant} &+ x_1 \log p_1 + (x_0 - x_1)\log(1-p_1) \\ &+ x_2 \log p_2 + (x_1 - x_2)\log(1-p_2)\end{aligned}$$

Solving for the log-likelihood equations

$$\frac{\partial \ell}{\partial p_1} = \frac{x_1}{p_1} - \frac{x_0 - x_1}{1-p_1} = 0 \qquad \text{and} \qquad \frac{\partial \ell}{\partial p_2} = \frac{x_2}{p_2} - \frac{x_1 - x_2}{1-p_2} = 0\ ,$$

we have the maximum likelihood estimates

$$\hat{p}_1 = \frac{x_1}{x_0} \qquad \text{and} \qquad \hat{p}_2 = \frac{x_2}{x_1}\ .$$

Note that $\hat{p}_1$ is undefined when $x_0 = 0$ (*i.e.*, no household was selected); and $\hat{p}_2$ is undefined when $x_1 = 0$ (*i.e.*, either no household was selected or no selected household cooperated).

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