

**Human Factors  
for Ergonomic ITs:**

**Research Notes for Exploration of Human  
Experiences and System Design Impact**

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## **1. Standard Reminders on Qualitative and Quantitative User Cultural Research**

Qualitative methods have the advantage over quantitative methods in respect to comprehension. Qualitative methods allow the investigator to dive into the deep meanings that participants narrate and hence have a more explorative approach. This allows for unexpected emerging categories to be considered, such as «cost», in the research conducted by Liu et. al. (2010), emerging from “qualitative interview data (...) analyzed to extract the factors influencing users’ acceptance of mobile entertainment” (Rau, Ploocher, & Choong, 2013, p. 183). The role of the researcher is relatively active in qualitative research, meaning that lack of training or lack of flexibility could induce huge biases. Yet, it is widely understood in this paradigm, that data is constructed from the interaction of investigator and the participants.

Quantitative methods, on the other hand, have the advantage over qualitative methods when it comes to comparing data and establishing some degree of representation over the general population. Though the role of the theoretical models is much more prominent and can bias the overall outcome towards certain ways of comprehending the phenomenon. The quantitative interviewer proceeds in search of an objective position. When adequate sampling methods are used, quantitative results may have a good representative interpretation of the whole population and statistics may be used in a descriptive or even correlational manner.

A mixed approach incorporates both ways of analyzing and working with data. Qualitative categorization “can be combined with quantitative analyses of standardized data (...) [even] triangulating the perspectives of different researchers on the data as well as seeking for respondent validation – to integrate participants’ perspectives on the data into the final analysis” (Flick, 2007, p. 102).– Combining both methods is very productive because the qualitative process can generate categories and data that later can be probed using quantification.

If an investigation only centers on quantification, it is very likely that aprioristic theoretical interpretations and understandings will modulate the whole results. Such was the case of mobile entertainment, in Liu et. al. (2010), research in which «cost», a novel trait not present in previous analytic models, showed to have an explanatory outcome on acceptance even though. Also, if only qualitative methods had been used, the study may had ended up being too narrow, stuck in the exploratory level. If so, we can derive some information from the participants, but still, it will not be possible to extrapolate it to the whole population or even know to what degree it is actually a better or worse interpretation of social and psychological processes.

It is perfectly possible to conceive studies only using qualitative or quantitative methods. Yet a mixed approach is wider, in this sense. It can explore and then verify representativity, even comparing with other investigations. When revising the design of systems over unstudied population, it makes a lot of sense to combine both methods. With that, we can compare preexisting models and statistics without totally over imposing theories, giving space for the emergence of new understandings that may be exclusive to this users' experiences, for example. Furthermore, this will allow a comparison of novel features with preexisting descriptions of the process.

## **2. How Does the way of Thinking Impact Think Aloud Research Methods**

Holistic thought refers to comprehension of the whole, a view in which relations and interaction play the main role in an interdependent and distinct picture. Analytic thought is understood as a way of thinking with a tendency to reduce, causalize, dichotomize and dissect the elements of phenomena paying attention to subjects and objects. Respectively, each approximation to reality has taken preponderance on the East and on the West. "Ancient Chinese philosophers saw the world as consisting of continuous substances and the ancient Greek philosophers tended to see the world as being composed of discrete objects or separate atoms" (Nisbett, 2003, p. 80).

One big difference is that an analytic standpoint may make it easier to extract or single out specific and discrete information where an holistic point of view would build meaning from the relations that the parts play in a whole. If "Westerners have an analytic view focusing on salient objects and their attributes, whereas Easterners have a holistic view focusing on continuities in substances and relationships in the environment" (Nisbett, 2003, p. 82), then in a usability test using TA, issues may arise when information is circumstantially encoded and the interpreter has an analytic understanding. Or vice versa, when compartmentalized information reaches an holistic decoder. For a Western evaluator, it may be hard to read and interpret the experience that an Eastern user is narrating; and for that user, it could be complex to understand the instructions provided from that evaluator.

Plus, Western users may have more tendency to separate ideas and hypothesize essences from objects, persons, situations and human social relations because "the atomistic attitude of Westerners extends to their understanding of the nature of social institutions" (Nisbett, 2003, p. 83). This means the difference between analysis and holism also manifests itself in the ways people communicate, construct, negotiate or discuss common meanings and common grounds, making the first stance consistency-oriented, while the second, completion-oriented. "If East Asians must coordinate their behavior with others and adjust to situations, we would expect them to attend more closely to other people's attitudes and behaviors" (Nisbett, 2003, p. 86). When using the TA method, upon a comment from the evaluator or a peer dialogue, analytic users are more prone to polarize impressions, but holistic users are more prone to average out different points of views, affecting the data that emerges from the method in both cases.

This kind of differences may affect the result of the tests depending on how it is designed. In fact, in parallel to the cultural origins of the participants, "culturally specific patterns of attention may [also] be at least partially afforded by the perceptual environment" (Miyamoto, Nisbett & Masuda, 2006, p 118) that is being presented to users. The degree of which a TA evaluation becomes more contextually involved and implied, or more sorted out by, for example, extrapolating it to smaller independent concise tasks; will affect the

performance, experience and reports of all users. This must be taken in to consideration when interpreting TA evaluations.

### **3. Effects of Computer Mediation in Decision Making Process of Users**

“Computer-mediated communication differs from traditional face-to-face communication because it limits people’s ability to use the full range of verbal, visual, and textual clues to influence others” (Li, Rau, & Salvendy, 2014, p. 13). This means that the if participants have an homogeneous degree of familiarity with the interfaces, one may expect that content and ideas have a more predominant role than nonverbal cues. This is may seem positive for a decision-making process to some degree, but one cannot forget that non-verbal, analogic communication and metacommunication are key factors in the construction of an interactive, comfortable and eloquent environment. In fact, “every culture has a set of values and attitudes that surround face-to-face social interactions” (Rau, Plocher & Choong, 2013, p. 78) that may enable or promote certain modes of communication and the participation of certain actors, determining the outcome and the decision-making process.

If nonverbal cues are missing, it may be hard for participants to get to a point of participative integrative trust in which they can freely interact productively to converge to a better choice. This may limit the decision-making process as some may substract themselves from the discussion because the feel awkward or uncomfortable. Plus, participants that have an indirect contextualized communicative style, or those who normally rely more on gestures and other analog communicative processes may have a harder time explaining themselves or participating.

This means that creating a comfortable environment, with clear and understandable rules and protocols, is critical. Building empathy in this environment may be harder, but allowing different kinds of media, customization, emoticons and other non-verbal elements may help the construction of this common interactive

space that enables a productive decision-making process. Balancing capacities regarding the interface operation is critical, as participants who have a hard time interacting with the system will tend to participate much less as well.

If rules and modes of communicating are understandable for everybody using the system and there is no ambiguity, if the interface allows each user to feel that the way in which he or she is participating is adequate and valuable, then the person will participate more actively. During face-to-face communication, many of the non-verbal gestures we are so accustomed to perform usually reinforce the relations between interlocutors, strengthen the channel and its fluidity, or negotiate statuses at some level. For example, making the other one note that we are listening, exhibiting to some extent of our emotional first impressions over an idea, or even expressing being in control or our willingness to obey. With computer-mediation, some of these may be absent for better or worse. Supporting analog or parallel non-verbal messages allows some of these interactions to reappear but it has its limits. Having a very clear framework can also help users not to have to rely so much in these meta-signaling in order to communicate. This will improve communication during the decision-making, leading to a better choice as well.

#### **4. Quality and Time Deciding Depend on the Composition of the Group of Participants**

I believe heterogeneity makes groups take in more points of view to deliberate, whence homogeneity tends to quicker agreements as positions are similar and converge with comparative ease. The heterogenous composition of groups will necessarily be specific to each group because of polarization, minorities and balance. In fact, “minorities in the unbalanced groups perceived stronger conflict during group discussion” (Li, Rau, & Salvendy, 2014, p. 13) so even if heterogeneity contributes, alone, it is not a direct indicator of a better decision quality. On the other hand, speed in making decisions is affected by every emerging group dynamic, group composition (including cultural and personal traits) and is intimately related to making better or worse choices.

I think that distinct group compositions may become more convenient in different decision-making scenarios. If the decision is not critical but has a critical response time, if it needs to be more unanimous and diligent, then a relatively homogeneous group may perform better because agreement and synchrony will emerge more naturally (on the expense of diversity). On the other hand, if a critical, creative and long-term decision must be assumed, something that will determine many complex and interactive factors; then a balanced group will perform slower but will probably choose in a better way, because different angles were incorporated during the process.

Yet, for heterogeneous groups balance is very important due to conflict dynamics. For example, if self-serving elites, alienated participants or hermetic minorities build up, they may be detrimental to the performance and the decision-making process. Status, individualism, power and identities underlie human group interactions inevitably.

Some real-life examples of homogeneity may be governmental teams set up to handle catastrophes. These groups must perform quickly, responding with action courses, with whens and hows, in order to deliver aid and resources to the different zones that may be affected by, for example, a quake, tsunami or fire. It may be better for this kind of groups to have some degree of homogeneity, as agreement must prevail and actions must be taken in synchrony, based on common meanings, not leaving to much space for interpretative divergence. If one actor understands differently, is not motivated or not convinced enough by the group's choices, the success of contingency plan may be hindered. Similar examples may be groups attending customer service, medical emergencies, police tactics, sports teams or firefighters, depending on the scenario. When a quick committed response is valuable; when slight differences in the decisions taken will not make much of a difference in the result compared to taking longer time to resolve, then homogeneity tends to perform better.

On the other hand, even in these same cases a second-line group, that is more heterogeneous may be analyzing the actions and decisions implemented by the first group, studying possible improvements,

considering many more factors, immediate results and diverse opinions, on the long-run. Though first-hand reactions that need to be fast cannot become tangled in long disquisitions, it is important to reflect afterwards. Heterogeneity of the collectives involved in this can add diversity to the decision, for example, when a government plans long-termed projects like the construction of a new city or a new hospital.

Here, “widely varying perspectives and opinions among team members make reaching a consensus difficult and time-consuming” (Li, Rau, & Salvendy, 2014, p. 12) because all perspectives will be considered, creating a bigger pool of possible solutions. But, as mentioned before, balance is critical, due to the fact that an unbalanced group can evolve in unwanted dynamics that can defeat this ideal or any benefits that come from heterogeneity. If deciding amongst more alternatives, and making everybody agree will take longer, but the quality of the solution will be richer and have more angles covered then: strategic choices, costly ones, and planning for actions that will need sustained and mancomunated efforts of large and/or diverse groups aiming to produce complex or high impact changes; these may be better undertaken by heterogeneous groups.

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