Lazy User Behaviour

Collan, Mikael

Institute for Advanced Management Systems Research

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Mikael Collan
IAMSR, Abo Akademi University
ICT Building A 4th floor, Joukahaisenkatu 3-5
20520 Turku Finland
+358-50-5567185
mikael.collan@abo.fi

ABSTRACT
In this position paper we suggest that a user will most often choose the solution (device) that will fulfill her (information) needs with the least effort. We call this "lazy user behavior". We suggest that the principle components responsible for solution selection are the user need and the user state. User need is the user's detailed (information) need (urgency, type, depth, etc.) and user state is the situation, in which the user is at the moment of the need (location, time, etc.); the user state limits the set of available solutions (devices) to fulfill the user need. The context of this paper is the use of mobile devices and mobile services. We present the lazy user theory of solution selection, two case examples, and discuss the implications of lazy user behavior on user attachment to mobile services and devices, and to planning and execution of mobile services.

Categories and Subject Descriptors
H.5.m [**Information Systems**]: Miscellaneous.

General Terms
Human Factors, Theory, Design

Keywords
User Attachment, Lazy User, Mobile Services, Mobile Devices, Adoption, Acceptance, Least Effort

1. INTRODUCTION
User adoption and acceptance of technology and attachment to mobile devices and services has been studied with a number of models like the Technology Acceptance Model (TAM) [1],[2], Unified Theory of Acceptance and Use of Technology (UTAUT) [3], Technology Task Fit (TTF) [4], [5] and HCI aspects with, e.g., cognitive fit theory [6], [7]. To our knowledge there are, however few theories that try to explain how users select solutions (mobile devices & services), when there are numerous possible solutions. In this paper we present a theory that explains the selection process as the user selection of the solution that demands the *least effort.*

Ideas regarding the use of least effort or least energy to fulfill a need can be found in physics (e.g. water flowing downhill follows the *path of least resistance*), but similar ideas have also been presented in behavioral sciences, e.g., in linguistics to explain scaling of human language [8],[9], where Zipf called his theory the *principle of least effort*. In information seeking (informatics) the theory of least effort was picked by Mann [10] as one of the principles guiding information-seeking behavior and hence the design of modern libraries.

The term "*lazy user*" has been used previously, e.g., in information seeking (text retrieval) [11], (user that uses only limited effort), in context aware computing [12] (user that demands the best effort – result trade-off), and in interactive feature selection [13] (sloppy user that does is not precise in her selection).

Some similar issues are also researched in finance, e.g., "lazy banking" [14] is research into how banks are not willing to invest efforts into turning around failing businesses, but prefer to liquidate, because liquidation is the *least costly* and the most certain alternative. It is interesting to note that in corporate finance effort can usually be measured with monetary units.

This paper continues with a short presentation of the lazy user theory of solution selection, based on similar ideas as the principle of least effort. We continue with two examples that illustrate the theory in connection with context of mobile devices and services and then discuss implications of the theory on users' attachment and mobile devices & services. We close with a summary and discussion.

2. LAZY USER THEORY OF SOLUTION SELECTION
The lazy user theory of solution selection tries to explain how an individual (user) makes her selection of solution to fulfill a need (*user need)* from a set of possible solutions (that fulfill the need). The set of possible solutions is a subset of universal solutions that is constrained (limited) by the *user state* (circumstances). The position that the lazy user theory of solution selection takes is that from the possible available solutions a user selects the solution that demands the least effort.

See Figure 1. In other words, the theory is based on the assumption that what is the path of least resistance in physics and the theory of least effort in informatics, can be applied to user solution selection to fulfilling a need, from a set of possible solutions (here we limit ourselves to the context of mobile devices and services, i.e., a mobile device or service is part of the possible solution set). And that this has implications on how mobile devices and services should be designed and on how users adopt and attach to them.

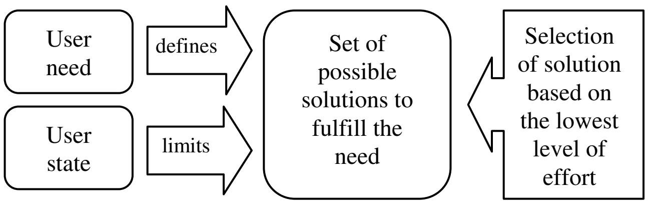

Figure 1. Lazy user theory of solution selection

For the purposes of this research we define the *user need* as an explicitly specifiable want that can be completely fulfilled. The need can be tangible or intangible. If the user need is, e.g., a piece of information, the description of the need would specify explicitly at least the type of information, the depth of information, the quality of information, the completeness of information, and the urgency of information delivery (see, e.g., [15] for studies on information need). The user need defines the (universal) set of solutions that fulfill the need. Of interest to paper are the user needs that can be fulfilled with mobile devices or services.

User state is the circumstances that surround the user at the moment when the user need arises. Examples of relevant circumstances are, e.g., location, available devices, available resources, and available time. The user state limits the universal set of solutions that fulfill the user need to the set of possible solutions. In this paper we expect that the user is in control of a mobile device (and services).

User need and user state define the set of possible solutions to fulfill the user need; the possible solutions can be material or immaterial objects and can be delivered by different devices or services, depending on the need.

The lazy user theory of solution selection assumes that the user will select the solution that demands the *least effort*. This requires that we describe what effort is and how we can order the amount of effort that different solutions require. For our purposes we observe that effort can be in the form of, e.g., time used, money used, energy used (physical work, mental work), or a combination of these. We assume that, within each individual form of effort, less of the form of effort is better, i.e., less money/time/energy used is less effort used. For situations where effort required is a combination of different forms of effort we observe that each individual has their own transformation function between the different forms, and that this individual transformation function may also change (according to circumstances – not necessarily different from user state). This means that different solutions carry a different level of demanded effort for different individuals at different times (circumstances). We want to observe here that for companies this kind of analysis may be easier, as the transformation functions are more transparent – time used for waiting or for doing physical or mental work have a price (cost), i.e., the measure is money - similar monetary measure may be impossible to define for individuals.

In addition to individuals possibly having different demanded effort levels for the same solutions, we also observe that the effort required cannot necessarily be explicitly determined ex-ante. This means that the users are making a "guess" or an estimate of the expected level of effort demanded by each possible solution. We also observe that the accuracy of estimates varies between individuals.

From the above we draw the conclusion that ordering the different possible solutions, when they consist of combinations of forms of effort, is difficult, and if this is attempted inaccuracy in this ordering should (must) be accepted (as precise transformation functions may be impossible to construct, and more importantly may prove to be useless, as they change). Such functions have been studied in economics since the early days of utilitarianism continued by neo-classical economics theories of agent preferences over choice sets. Our position is that if such preference ordering is tried it should be robust enough to have some practical use, such that it overcomes the differences between individual variances in preferences; fuzzy logic may offer an answer, if mathematical modeling is attempted.

To sum up, effort demanded by the solution is the amount of time, money, or energy (or a combination of these) used to fulfill the need and the user selects the solution that will fulfill the need with the least effort. In cases where the expected amount of effort demanded by more than one solution is equal (so similar that the user cannot make a definitive choice) the user is assumed to be indifferent in her choice between solutions.

3. EXAMPLE - RESULT OF THE GAME

A sports interested mobile telephone owner user has made a bet on the result of the game and knows that the game has ended. She wants to know, as soon as possible, if she has won. The user need is, therefore, information on the end result of the game, as soon as possible. The overall possible ways of getting the information are numerous, however, if we consider two user states a) the user is at home watching TV on the sofa and b) the user is at an airport abroad waiting, the set of possible ways to obtain the result of the game are different. In user state a) we assume that the user has eight different possible solutions (radio, TV-news, teletext, call friend and ask, newspaper next morning, internet, mobile Internet, and SMS result service). In user state b) the set of solutions are limited to the possibilities offered by the mobile phone (call friend and ask, mobile internet, SMS result service) and Internet at the airport at an elevated cost.

In user state a) the user choices that offer the least effort are teletext (the user is sitting on a sofa with a remote control nearby), an SMS result-service and TV-news. Depending on chance the TV-news may be showing the result instantaneously, which would make it the least effort solution, however, if this is not the case and the user is an experienced user of teletext, then teletext would be the least effort solution. However, if the user is not experienced with teletext and there are no TV-News that would show the result, then an SMS service would be the least effort solution. It seems that there may be a set of solutions that offer very similar low levels of effort, which makes the selection of the solution difficult to the user. In such cases the user familiarity with the solution may be the deciding factor, e.g., if the user *is not* accustomed to using teletext and *is* accustomed to using the SMS service, then the SMS service may be the least effort solution even if the user is sitting next to the television. In any case, it is most likely that the user will select one of the three solutions identified here as the least effort solutions.

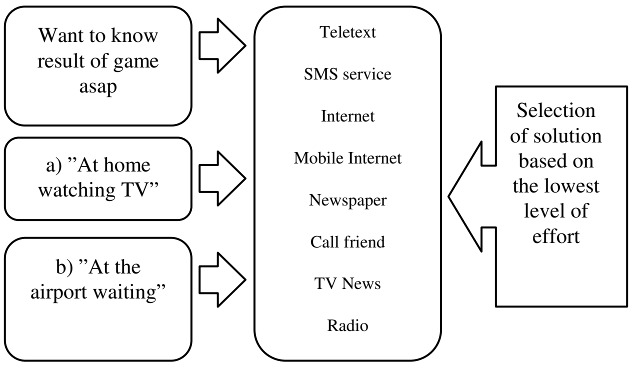

Figure 2. Result of the Game

In user state b) the user has a more restricted set of possible solutions and the least effort solution is the SMS service. The set of possible solutions is dictated by the state of the user.

If the user needs are unconditional (crisp, non-fuzzy), i.e., truly "as soon as possible" then the set of possible solutions is only the solution that will fulfill the need fastest, in user state a) either teletext or the SMS service, or in state b) the SMS service. If however, the statement is fuzzy, and the user need asap actually means "in the near future" or "soon" then the set of possible solutions is also fuzzy.

A possible implication of the example is that finding instances of needs that are unconditional will help in identifying services that users will have a high level of attachment to, because they fulfill their (unconditional) need better. Another issue that is of importance to attachment (and adoption) is the effect of the "if it works don't fix it" mentality, i.e., if the user is an experienced teletext user (e.g. remembers the teletext page on which game results are shown), then teletext will remain the least effort solution, even with advanced shortcut buttons for the SMS service. This indicates that if there is a "sunk effort" in learning to use a solution it will make the development of attachment to new solutions more difficult. Further, it indicates that there must be a different user state that must first create the need to trigger the learning effort for a new solution that can after the new "sunk effort", in the different user state, replace the old least effort solution (learning to use the SMS service at the airport will make it as effortless to use also while watching TV, and can hence become the universal least effort solution). The amount of learning effort users have to invest may explain the speed of adoption and attachment.

4. EXAMPLE - mTICKET

In our second example we discuss the Helsinki City Transport Company's mTicket that enables mobile phone users to pay for their tram, metro and bus tickets with an SMS. More information on the actual system can be found from, e.g., [16]. We expect that the user is not a holder of a tram pass, that she has a mobile telephone capable of sending and receiving SMS, and that she is waiting at the tram stop. The user need is to get the ticket for the tram. We are considering two different user states a) the user is in a hurry and does not have cash and b) the user has all the time in the world and is carrying cash.

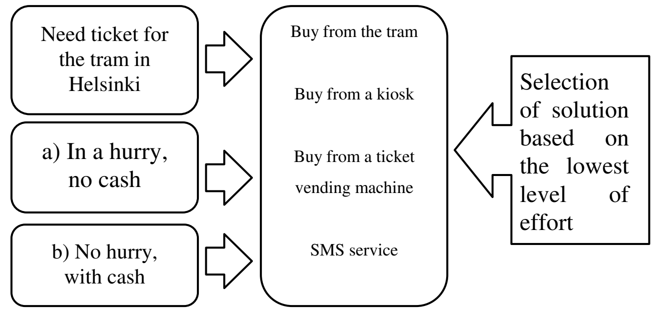

Figure 3. mTicket

The set of solutions for buying the ticket are to buy one from the tram (with cash), to buy one by using the SMS service (information on every tram stop), to buy one from a kiosk (non-evenly distributed throughout the city), or to buy one from a vending machine (available at metro stops).

In user state a) the user choices to fulfill the need are reduced to buying the mTicket, as the user has no cash (trams accept only cash) and as she has no time to buy with a credit card from a kiosk, or a vending machine, both located at a distance.

In user state b) the user choices are all the four possible solutions. According to the lazy user theory the user selects the solution with the lowest level of effort. In user state b) the least effort is to buy the ticket from the tram with cash, or to buy the mTicket. Buying the ticket from the tram means that the user must walk to the front of the tram and buy the ticket from the driver; buying the mTicket means the user must take her mobile phone and send an SMS to the correct number. Even if the user would have unlimited time (and can afford to miss the next tram) it is unlikely that buying the ticket from a kiosk, or from a vending machine, would under any circumstances be the least effort solution. If the tram does not come instantly and the user has spare time to buy the mTicket (and at the arrival of the tram just walk in the tram), the least effort solution will most likely be to use the mTicket.

User attachment to mTicket can be enhanced by advertising the service, e.g., at the tram stops – potential service users that have time to wait for the tram are likely to adopt due to it being the least effort solution. Further, there are a number of other possibilities to enhance the attachment of users to the service, e.g., the pricing policy of mTicket can be made such that it gives an incentive to use, which reduces the workload of the drivers and contributes the trams ability to keep the tight timetables (service quality). Additionally, if the mTicket is available as a shortcut, e.g., in the services menu of the mobile phone as a "one-button-solution" the effort will be even further reduced and possibly make the mTicket clearly the least effort solution. The above mentioned issues are also usable indicators for service design more generally.

On a related note, in 2006, in Stockholm, Sweden, referring to safety concerns bus drivers refused to accept cash payments after a series of ticket payment robberies. This resulted in losses for the City of Stockholm – an mTicket type solution would possibly have solved the problem.

5. SOME IMPLICATIONS ON USERS' ATTACHMENT & MOBILE SERVICES AND DEVICES

Based on the discussion and examples above we can draw some conclusions on the implications that the lazy user theory of solution selection can have on users' attachment and on mobile devices & services.

The theory would indicate that if a solution is a universally least effort fulfillment to a need, then the user would always use it for the need, put in other words, this means that the user would be fully attached to that solution – this is in concert with Zipf [8] "To be habitual, an action must be relatively effortless (or carry a particularly large psychic reward)". mTicket is an example of a close-to-universally least effort mobile service for sporadic tram users (monthly passes are even lower effort for everyday users due to significantly lower cost).

Design of mobile devices and mobile services from the point of view of least effort can yield a different focusing of resources in mobile service provision, i.e., HCI and the ease of use would become more important considerations. For example, providing desktops of mobile devices with similar shortcuts that we find on PC desktops might enable them to be more effortless to use and hence users' attachment to them might increase. In the result of the match example a shortcut to match results would probably make the SMS service unbeatable at ease of use.

By searching identifying user states where there are no devices that fulfill the user needs (fill the void tactics) and by identifying unconditional user needs (truly asap) niche markets for services can be found.

Possible "sunk effort" of learning issues may make users "mentally allergic" to having to learn new things, when they already know one easy way of fulfilling their needs – the marginal utility of a very small increase in ease may not justify the effort of learning, at least if circumstances (user state) do not change. This is again in line with Zipf's [8] prediction that individuals are turned back by modest obstacles that they know could be overcome by spending some effort. This means that users may not adopt new solutions unless the cost of learning is not fully refunded by advances in ease, however, if a solution is adopted and a lower level of effort is reached there is friction in changing to an even lower effort level new solution due to the sunk effort in learning.

6. SUMMARY AND DISCUSSION

This paper has presented a theory about solution selection that is based on the principle of least effort. Two case examples were presented and two different types of user needs, information need and payment need, were used to illustrate the theory. Some implications to users' attachment and to design of mobile devices & services were discussed.

How far the theory is from previous theories, e.g., TAM, UTAUT, TTF & cognitive fit? We feel that it has a number of points of tangency. All of the theories seem to be united on ease of use, i.e., low effort level being a major issue in adoption & attachment.

Future research on the issue should include looking at existing devices and services from the point of view of the theory, researching user order of selection of solutions empirically, and looking at possible models to explain, e.g., attachment based on the theory (based on, e.g., what we know about least effort theory from informatics).

NOTE: A later version of this paper has been presented at the IADIS CELDA 2007 Conference.

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