

# The Role of a Psychologist in E-commerce Personalization

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## Abstract

Typically, when marketing specialists approach commerce, they rely heavily on statistical models that make predictions about the behavior of the entire customer population, or divide potential buyers into groups that are similar according to a selected criterion. We believe that e-commerce requires further individualization of buyer-seller relations. However, to achieve a true content personalization including expertise of a psychologist would be of extreme importance.

## 1. Introduction

When designing an e-commerce site, an extended knowledge about the commodities to be sold and about their potential buyers is required. Currently, such knowledge comes typically from statistical analysis, which is focused on the entire user population. Additional techniques can be used to cluster customers into groups that are similar according to some characteristics. The primary reason for application of this particular approach comes from the standard business mantra: maximize sale of a given product to all customers; and thus all customers matter equally, while the product to be sold matters “more.” In addition, in standard commerce it is almost impossible to adjust the selling strategy to each individual customer (except in very small local stores, where owners knows most of their customers personally). Recently it was noted, that with the advent of e-commerce the business approach has to change into: maximize sales of multiple commodities to each individual customer (and this signifies return to the small store metaphor for business practices). In this note we will argue that psychological analysis can provide a very important dimension of support for e-commerce personalization.

## 2. The need for psychological knowledge in e-commerce

The shift from commerce to e-commerce requires a number of changes in business practices [MON] (the list presented here is not considered exhaustive, but contains some of the more important features):

1. non-stop transaction processing,
2. practically unlimited space of available commodities,
3. potentially global reach,
4. ability to collect large amounts of data about behavior of individual customers,
5. human-human interactions replaced by human-computer interactions,
6. customers that can be drowned in information overload.

In the context of this note we are particularly interested in factors 4-6 combined with the assumption that the main objective of e-commerce is to maximize sales of multiple commodities to each individual customer. Typical approaches to support commerce depend on application of models and techniques that involve the entire population (e.g. studying long- and short-term trends), or divide it into groups of similar behavioral profiles (e.g. clustering). The situation changes, however, when the e-commerce is considered. Here it is **possible** to collect and almost immediately process much larger amount of data about each individual customer. This data should be therefore used to provide personalized service. However, to be able to do this it is necessary to move beyond the population and/or group-oriented approaches and apply techniques and models focused on a client as an individual, and it is the psychologist that has the expertise that is needed in this situation. Therefore, the psychologist should become a member of the e-commerce support team and play a role in both the initial design of the e-commerce site as well as its long-term functioning. Before we proceed further let us try to illustrate, in Figure 1, various levels of e-content personalization and their interactions.

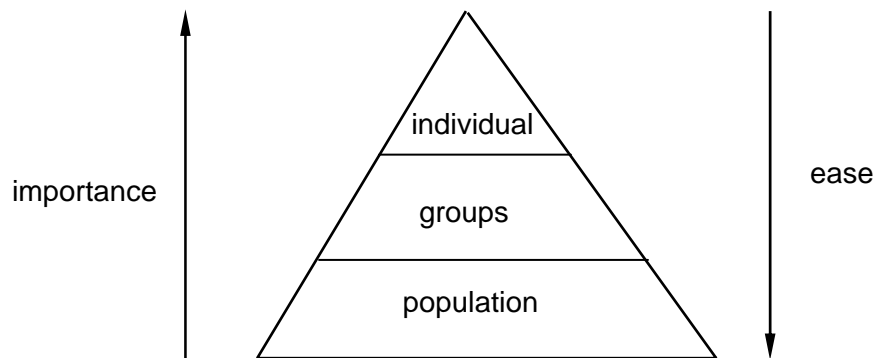


Figure 1. E-commerce content personalization – levels of conceptualization

Figure 1 indicates that while the knowledge about the needs and desires of the entire population of potential buyers is the easiest to collect and analyze, it is also the least important from the point of view of e-commerce. At the same time the knowledge about the individual preferences is the most important and the most difficult to gain. It is in the latter case that the expertise of a psychologist is the most desired.

In this context we should note that during the human-computer interaction, we might observe a change of personality of the person sitting in front of the computer. In other words, we may not deal with the “real” self of the customer, but with a “virtual personality.” This is one more argument for considering the psychology of the consumer.

### ***3. The role of a psychologist***

Let us now consider the initial design of the e-commerce site. Obviously, IT Personnel (we include a professional artist-designer here) will be responsible for the technical details of the project. At the same time the marketing expert(s) and statistician(s) will provide the population and group-oriented perspective, while the psychologist(s) will be responsible for the individualized views of the buyer needs and ways of satisfying them. The proposed flow of information is depicted in Figure 2. Here we indicate that the

psychologists, statisticians and marketing experts teams work together and specify the requirements of how the e-commerce site should be designed (look and feel), while the IT Personnel is only providing feed-back about the technical feasibility of the proposed solutions. In other words, the proposed approach is non-IT driven. While this may be counterintuitive, we believe that the role of IT is to deliver what is required of them, not to hijack the project and try to make it fit their favorite technology.

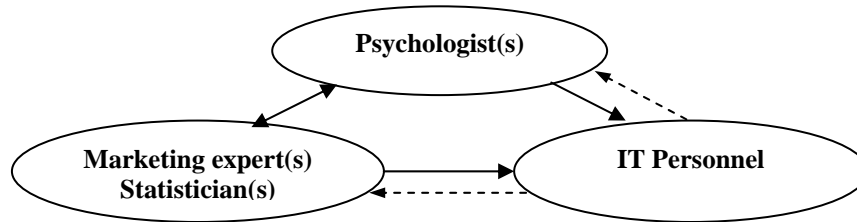


Figure 2. Relations between the members of the team

When visiting any web site, the clients can characterize its overall quality by considering factors such as: the way the site looks/communicates, the quality and quantity of the informational content and the quality and quantity of the advertising content. These factors lead to different types of personalization: personalization of the way the information is presented, the way the page communicates at an emotional level with the visitor (arrangement of the browser screen, colors, the presentation of new content notifications), personalization of the informational content (the information is filtered to match the user interests), personalization of the commercial content [GAL]. While there is a role for the psychologist in all three types of personalization, it is the way the information is presented and interacts with the visitor that concerns the psychologist the most. Thus, for the purpose of this note, we will practically omit the remaining two. Communication is a process based on stimulation, which carries messages. It involves not only in delivering information, ideas but also influences the energy, emotions, and feelings of the client. Clients are inevitably different, perceive differently and have different interests and objectives [PRUT] and therefore we need to find a way to uncover these facets of perception and to deliver the content in the most appropriate way. Also, note that an e-commerce system has to be able to cater to customers since the earliest moment when they enter the site (new customers).

### 3.1 User profile initialization

As a part of the initial design, we need to prepare the system to deal with new customers. As discussed in [GAL], this is a very complicated issue as there are at least four different approaches to user profile initialization, and neither one of them is without problems. Obviously, one of the easier ways to approach profile initialization would be by asking the potential customer to fill a detailed questionnaire. However, nobody likes to fill long, time-consuming questionnaires (and the Internet seems only to amplify our desire for instant gratification). We could proceed with a short questionnaire and match the information against the customer clusters, however this assumes that we already do have large enough number of customers to reasonably group them together, which may not be the case in the early stages of systems' existence. Similarly, the reliance on spy-ware that would study the content of the user personal machine to learn about her habits is ethically inappropriate and technically unfeasible (as, for instance, the customer may use someone

else / generally accessible computer to login to our system). Finally, the general dialogue about habits and hobbies, may not be well received by some potential customers. In [GAL] it was suggested that a combination of techniques enhanced by personalization of approach might lead to the best possible outcome. This is where the expertise of the psychologist plays the crucial role. The long and the short questionnaires should be both available and the psychologist should help mixing-in questions that would assess important (from the e-commerce perspective) psychological traits of the customer. In addition, it will be primarily the psychologist who will have to be the designer of the “free-dialogue” interview that should also be available to the potential customer, while being the most difficult to analyze. All these forms of information acquisition will allow us to personalize the information delivery and provide an appropriate support to the customer (even a minimal information based on the short questionnaire will be useful).

Here we need to note that the human psychologist cannot analyze the questionnaires and the dialogue. Assume that a constant stream of potential customers starts logging-in to the site (after a marketing campaign), it is impossible for a single human psychologist to analyze 1000 potential customers in real-time. In this case almost 1000 psychologists available on-site all the time would be required. This is impossible, and therefore the data needs to be analyzed by the personal software agent (designed by the psychologist). This approach allows introducing personalization to the user account initialization process itself. We will discuss the personal agent and its functions in more detail in Section 4.

### *3.2 Long-term role*

Let us now assume that the system is already functioning and is receiving customers who are interacting with it, making purchases, accepting advice, following advertisements, rejecting suggestions etc. Obviously, we are able to collect data about every single click made in the interface, every decision (positive and negative) made by the client etc. Obviously, this data should be stored in the user behavior database and mined (for more details see [GAL, JAK, MON]). However, data mining techniques work the best for assessing customer groups and the entire population, while they may not be very effective in case of an individual. In addition, regardless of the technique used, data mining works the best with very large data sets. While we can collect a lot of data about each customer, it is likely to not be enough to obtain precise results. Here, again, we have to depend on the expertise of the psychologist. It is very likely that new and/or modified techniques of data analysis need to be designed to deal with the e-commerce oriented psychological analysis. The psychologist will have to monitor the system and fine-tune it as it works. While, again, due to the sheer volume of it, he cannot analyze the data pertinent to all customers (this will be the function of personal agents), he must analyze all special situations occurring while the system is functioning. Based on this information he has to help update the user profile management modules that personal agents use to fine-tune user profiles.

Summarizing, we have argued that there is a role for a psychologist in all phases of the design and functioning of an e-commerce system. This comes from the fact that e-commerce is moving back toward the small-store business approach and content personalization is the key to its success. In this case it is the psychologist who may have the right expertise (or be able to develop new methods) to support the most difficult, but most important levels of content individualization.

#### ***4. Personal agents***

The personal agent is the focal point of the e-commerce system (for a design based on this principle consult [ANG]). It will also be the personal agent that will have a complete control over the client-system interaction. When dealing with the new customer it will analyze the questionnaires and the dialogue with the client to establish the best scheme for the personalization of the web page format and of the content presented there. It will be capable to interpret the information from the questionnaire(s) and/or the dialogue in real-time and further personalize the content of the questionnaire and/or dialogue depending on the answers already given. This helps us maximize the amount of information usable to create the initial user profile. Observe that the initial profile is built only once, however a lot of functionality related to the user profile personalization remains unchanged also when the system is running. The agent will watch client's tendencies: type of searches, types of information she is interested in, the reaction to the advertisements, type of advertisement she prefers etc. and use this information to fine-tune the user profile. To be able to support this functionality and, at the same time reduce the overall size of an agent, we will follow example set forth in [SAT] and proceed with modular functional design and appropriate modules will be loaded by the agent whenever needed. To achieve this we will separate a set of initial user profile creation related modules, a set of account modification modules and a set of general personalization modules which will be used depending on the type of interaction that the agent is involved in.

We have to note that the transition from the traditional commerce to e-commerce implies also transition from the real world to the virtual world. The seller-buyer relationship, the human-human interaction, is changed into a human-machine relationship. One of the main problems here is the impersonal character of the contact and the dynamics of the conversation that resembles that of a monologue [LUCA]. This can lead to a feeling of discomfort and even impatience in the client. The communication structure between agents and clients can be helped by the system being able to adapt to the human communication style [PRUT]. The personal agent should mimic the seller-buyer relationship with its psychosocial connotation. When people communicate, the words combine with other signals: vocal (voice's tone and volume, cough, accent, sigh), visual (look, smile, mimics) or tactile (touch, strike, caress) to deliver a complex stimulation [PRUT]. A technical solution to this would be to build agents based on virtual reality, or at least multimedia capabilities. While the complete implementation of the proposed solution may be years away, avatar agents are already moving in this direction.

During its service, agents may be confronted with situations in which they cannot find the guidance in the user personal profile. For instance, let us assume that the e-commerce system is a travel agency and now imagine a person who wants to go on vacations, but has no idea where he would like to go. What are his expectations from a travel agency? Likely, he expects a suggestion that matches his unspoken and, possibly even unrealized, desires. But how is the personal agent supposed to guess these desires? In the ideal circumstances the personal agents to promptly give advice to all specific situations according to the personality of the consumer. In the case that the agent cannot find an answer based on the user profile, the personal agent will have to use the more general information. Here the conceptualization of the levels of information personalization

depicted in Figure 1 comes to play again. The personal knowledge is the most important and has to be utilized first. In case it is not available, then the group-oriented information should be utilized. For instance, in case when we are not sure what type of vacation our customer is interested in, we should make suggestions based on the fact that he is 35 years old, single, lives in a given neighborhood etc. The same procedure has to be applied in the case when the group-oriented information is not available, or if the client does not match any of the groups particularly well. Then the population information has to be applied. For our example, we would use the general travel trend of a given season, to make suggestions. In addition, information about unpredicted situations, in which the agent is not able to find answers, should be reported and may require subsequent analysis made by the psychologist. There are two possible situations. These that represent predicted errors and are ignored but stored for further, e.g. statistical, analysis. Situations that are unique or represent a phenomenon that is immediately deemed relevant to the expert need to be expeditiously dealt with. They may lead to changes in the user profile creation and or modification modules, as well as the agent-customer interaction modules.

### ***5. Concluding remarks***

The aim of this note was to argue that the psychologist has an important role to play in the design and operation of an e-commerce system. This is because he has the expertise to support the individual orientation, so important in the next generation of e-commerce endeavors. The main open problem is transfer of the psychological knowledge into the system design and, in particular, personal agents. Our goal is to approach it further in the near future.

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