NEW GENERATION COMPUTING

Creative Communication for Chance Discovery in Shopping

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Abstract   This study considered an information presentation method to help customers make a concept-articulation type of purchase. When customers follow the concept-articulation type of thinking, they only have vague requirements and try to make a gradual clarification of what they really want through the interaction with salesclerk(s). Skillful salesclerks can communicate with their customers appropriately to discover an opportunity for bringing the customers to their concept-articulation, which often leads to a successful sale. Based on the observations from our analysis of these human behavior in actual purchase activities, we constructed a system called S-Conart (Concept Articulator for Shoppers) to support the concept-articulation type of purchase. The user study conducted using S-Conart shows that using a different method of presenting information can cause a change in the user's mental world, which is also observed in a real-life shopping situation, although in a different form. The result of this user study suggests the possibility of chance discovery by customers themselves, which is expected to be useful for building support systems for concept-articulation type of shoppers.

Keywords: Purchase, Online Shopping, Concept Articulation, Creativity, Chance Discovery.

§1   Introduction

Purchasing is an everyday act which everyone experiences in his/her daily life. Although each purchasing is merely a little decision-making, it provides us with serious mental activities of great interest. Purchasing is usually assumed to be buying what we want, however, our wants are often not determined until actually shopping around as Underhill pointed out in his book.[11]

When we observe human behavior in the actual purchase activities, the underlying mental process may be roughly categorized into the following two types: *problem-solving* and *concept-articulation*. When customers follow the problem solving type, they have clear image and functional requirements on desired products, and perform problem-solving in a way that they look for the products which meet their requirements. When they follow the concept-articulation type, on the other hand, they only have vague requirements on their needs, and try to make a gradual clarification and/or refinement of their requirements through the interaction with salesclerks and so forth.

Most of existing online shopping sites assume that customers' requirements have been already determined.[6] That is, they only target the problem-solving type of purchase. This study aims at developing online shopping systems which can help the customers make a concept-articulation type of purchase. Its purpose is specifically to establish information presentation methods to effectively support the customer's concept articulation process and to build the design methodology for Human-Computer Interaction (HCI) to realize them.

This study started with observing human behavior in the actual purchase activities. Then, the protocol analysis of actual conversation between a customer and a salesclerk revealed that appropriate information given by the clerk in a timely manner often causes the customer's focus to be diverted leading to the change of his/her search goal itself in their decision-making process when shopping. It is also found that this interaction is effective in decision-making for the concept-articulation type of purchase.

Based on these knowledge acquired from the analysis of human behavior in the actual purchase activities, this study has created a system, called S-Conart(CONcept ARTiculator for Shoppers), to support the concept-articulation type of purchase. The authors are developing a system which puts special emphasis on the appropriate information presentation to support the customer's concept articulation instead of replacing human communication with HCI as is. This paper describes the system overview of S-Conart and introduces the result of the user study conducted with S-Conart. Through this user study, the authors argue that changing the content and/or presentation method of information provided by the system can bring an equivalent change to the human mental world, although it is in the different form from the human interaction.

Our study shows that creative thinking process is observed in everyday behavior as well as in professional creative activities. Although such "creativity in real life" is a small one compared to those in scientific inventions or discoveries, it is more frequent because of its everyday nature. If you are good at exerting small creativity or helping others with small creativity, you can gain an advantage in business. For example, a competent salesclerk can help his/her customers to articulate their concept, which leads to good sales performance. In this sense, creativity in real life or concept articulation is a kind of *chance discovery*. Therefore, in this paper, we define chance discovery as: *to promote shifting the context towards articulation of the customer's concept* of what he/she wants. In the example of real life shopping behavior, the salesclerk plays a primary role in

chance discovery. The online shopping experiment with S-Conart suggests the potential that the customer can discover a chance by him/herself.

§2 Human-Human Communication

This study first made an examination of human behavior in the actual purchase activities.[7] Specifically, protocol data for customers' behavior in actual apparel shops were collected to be used as a clue to the decision-making process of customers. The authors recruited sixteen subjects for the data collection and had them carry a taperecoder when they go shopping to record the conversation with salesclerks in the shops. Among 107 pieces of purchasing protocol data collected, 51 cases were analysed excluding remaining 56 cases because of difficulties in data analysis from inaudibility of voices recorded, use of demonstrative words such as "this" and "that," and so forth.

2.1 Two Types of Purchasing

A detailed observation of actual purchase activities has shown that purchasing can be roughly divided into a problem-solving type and a concept-articulation type. The actual purchasing activities use either problem-solving or concept-articulation type according to circumstances. Also, both of them are sometimes observed to be mixed in each purchasing.

[1] Purchasing as Problem Solving

With purchasing as problem solving, the customer initially has a clear idea of what a desired product is like and/or what functionality it requires, and searches for the items which meet his/her requirements. That is, purchasing as problem solving means that the customer has previously determined what to buy. The customer who follows purchasing as problem solving searches for the products meeting his/her requirements to discover solution candidates, balances between them (if there are more than one), evaluates them, and then decides whether to buy them.

[2] Purchasing as Concept Articulation

With purchasing as concept articulation, on the other hand, the customer initially has unclear requirements for his/her needs and gradually builds up a concrete image of target products through the interaction with a salesclerk. That is, purchasing as concept articulation means that the customer determines what to buy after due consideration in the shop. Customers who follow purchasing as concept articulation start with vague requirements of their own, become aware of their underlying requirements with a trigger of some information provided while looking around various products, understand what their true requirements are, convince themselves of the adequacy of some of the products for the requirements, and then make a decision on whether to buy those products. They don't conceive their true requirements until they actually look at products.

The purpose of this study is to propose a framework which effectively facilitates this type of purchasing whether actual or virtual (i.e., online shopping).

2.2 Communication Patterns

This study considers the information presentation to effectively support purchasing as concept articulation which provides gradual clarification of the customer's requirements of initial vagueness, and aims to apply it to online shopping systems. In order to serve as a reference to this human-computer interaction design, the authors have observed the communication between a customer and a salesclerk in actual purchase activities and investigated the change in the customer's mental world caused by the communication with the salesclerk.

The analysis showed salesclerks' interaction patterns could be classified into two types, that is, *expected reaction* and *unexpected reaction*.

[1] Expected Reaction

In a regular purchasing, a customer reaches a more satisfactory solution or product through the conversation with a salesclerk. In such a situation, the salesclerk provides the customer with another solution or product that better meets his/her requirements. Salesclerk's role is considered to present solutions (products) to meet the customer's requirements. The reaction to fulfill this role is called expected reaction. This kind of reactions from the salesclerk confirms the customers requirements or thinking, and presents candidates that better meet the requirements. It is often useful for purchasing as problem solving.

In case of the expected reaction (as shown in Fig. 1), both search goal (long jacket) and mental focus (length) of the customer remain constant, and the target item (candidate B) is recommended which is evaluated higher than the current item (candidate A) in terms of the mental focus.
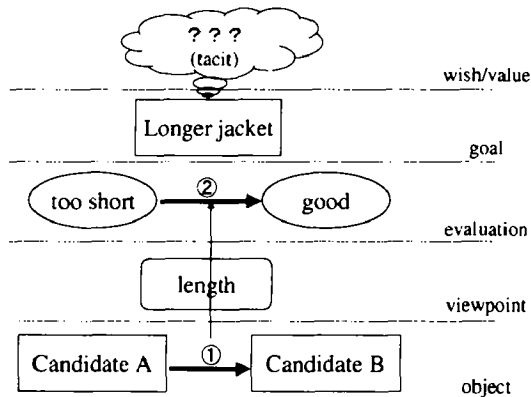
Fig. 1 Changes in the customer's mental world caused by the expected reaction:

i) The customer, who is looking for a long jacket, thinks candidate A is too short. ii) The salesclerk presents the customer candidate B which is more appropriate in terms of the length (① in this figure). iii) The customer evaluates candidate B to be good (② in this figure), and resultingly buys it.

[2] Unexpected Reaction

On the other hand, the authors observed reactions that promoted customers' decision-making by giving opinions that provided customers with a different viewpoint. The reaction which presents information from a different viewpoint other than the customer's current thought is called unexpected reaction. This kind of reactions from a salesclerk is unexpected, in the sense that it is diverted from the usual reaction, which presents solutions that better meet the requirements of customers. It is often useful for purchasing as concept articulation. This is because a new viewpoint presented by unexpected reaction in a timely manner causes the search goal itself to change to be more suitable for the customer's potential requirements, and helps the customer to have a clearer image of his/her own requirements.

In case of the unexpected reaction (as shown in Fig.2), a new focus (balance) presented by the salesclerk triggers the customer's mental leap, and his/her goal changes accordingly from long jacket to short but well-balanced jacket, resulting in the change of her evaluation of the current target item (candidate A) to promote her decision-making.
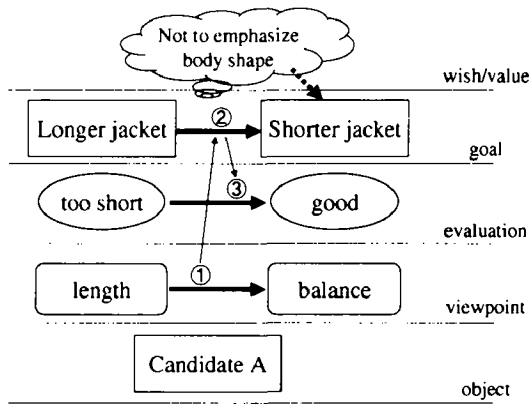

Fig. 2   Changes in the customer's mental world caused by the unexpected reaction:

i) The customer, who is looking for a long jacket, thinks candidate A is too short. ii) The salesclerk decides that the true goal (i.e. values) for the customer is "to show himself/herself in good shape" from the context of conversation. The salesclerk points out to the customer that the balance is more important than the length in presenting a good shape. iii) The customer's viewpoint is changed into balance (① in this figure). iv) The customer understands that a short and well-balanced jacket is suitable for presenting a good shape and changes his/her search goal into short jacket (② in this figure). v) The customer, in turn, evaluates the current candidate A to be good (③ in this figure), and resultingly buys it.

2.3 Creative Communication for Chance Discovery

Which of expected and unexpected reactions is an appropriate interaction depends on the current context. Our analysis also showed that capable salesclerks can successfully grasp values and potential wishes of customers through an

appropriate interaction pattern for the occasion, whereas less capable salesclerks tend to adopt an inappropriate pattern. In other words, skillful salesclerks can communicate with their customers appropreately to *discover a chance* of the costomers' concept articulation, which often leads to a successful sale.

Typical examples are shown below. Among different purchasing cases of different subjects, five cases happened to have the same situation where they mind that the jacket under consideration is too short. Below is an example of unsuccessful conversation which didn't lead to a purchase. The salesclerk's reaction in this case was expected one.

Customer I want a little longer one. This (candidate A) is a bit too short. I want to cover my waist as much as possible.

Salesclerk (After considering for a while) If so, how about this one (candidate B)? This is tucked in the waist and designed to have a long hem.

Customer Well, let me see... I'm afraid this is not my taste.

Shown next is an example of successful conversation which led to a purchase. The salesclerk's reaction in this case was unexpected one.

Customer This (candidate B) is a little short, isn't it?

Salesclerk Such a design is popular this year. Almost every shop deals with short ones. Do you prefer longer one?

Customer Too short to cover my waist...

Salesclerk It depends on the balance with your skirt or pants. 'cause you're now wearing shorter tight skirt, you think that way, but if wearing a long skirt, you will feel better.

In the former case where the conversation didn't lead to a purchase, the salesclerk responded straightforward to the customer who was hesitant about the short jacket by presenting a longer one, whereas in the latter case where the conversation led to a purchase, the customer's mental world was changed from one where the relevant attribute was `length of jacket` to another where a different attribute called `balance` was relevant. Through the conversation, the capable salesclerk shown in the latter case could grasp the customer's wish that she wanted to make herself look as good-shaped as possible, and induced the appropriate goal (`short but well-balanced jacket`) in accordance with it.

2.4   Creativity in Purchasing

Interestingly, the interaction patterns recognized in our analysis of human behavior in the actual purchase activites agree well with assertions by previous studies on creative support.

Gero grouped the design activities into the following three types: *routine design, innovative design,* and *creative design.*[2] Routine design can be defined as

that design activity which occurs when all the necessary knowledge is available. Innovative design can be defined as that design activity which occurs when the context which constrains the available ranges of the values for the variables is jettisoned so that unexpected value become possible. Creative design can be defined as that design activity which occurs when a new variable is introduced into the design. Boden defined the ordinary task as one within a concept space and the creative task as one which causes a concept space itself to change.[1]

The capable salesclerk shown in the above example changed the customer's mental world from one where only variable called length was handled to another where a new vaiable called balance was introduced. This is exactly the same process as the creative design.

Traditionally, when the creativity is mentioned, it is often taken as a special capability of special professionals such as artists and researchers. Also in the field of creativity support studies, the implementation of support systems has been attempted for specialized activities such as designing and paper writing. However, the above example shows that people display their creativity even in everyday activities such as purchasing. In their everyday activities, they adroitly realize a similar process to the concept articulation process observed in the creative activities.

§3   Human-Computer Interaction

Based on the observations from an analysis of human behavior in actual purchase activities, the authors have built a system called S-Conart (CONcept ARTiculator for Shoppers) which facilitates purchasing as concept articulation.

3.1   Approach

Capable salesclerks combine various knowledge appropriately using meta-level strategic knowledge to provide suitable information for the context. Can the human-computer interaction be expected to have such richness of the human interaction? An approach immediately thought of is to build capable software agents equivalent to capable salesclerks. However, it is yet to be solved well what strategic knowledge capable salesclerks have and how they make use of it.

As such, the authors take a different approach to the design interaction. That is, they are developing a system which puts special emphasis on the appropriate information presentation for facilitating the customer's concept articulation instead of replacing human communication with HCI as is. This approach is based on the idea that changing a representation system for information presentation by computer to human being has the same effect (in a sense that user's mental world is changed) as that for applying different strategic knowledge to control the interaction.

In order to consider what system providing what infomation should be implemented with this approach, it is necessary to organize what information presentation is useful in changing customer's mental world in the human interaction. An examination of information provided by salesclerks has found that the following two types of information are useful for helping customers in their

purchasing as concept articulation with the unexpected reaction:

- Well-arranged relevant information that prompts the user to conceive a new viewpoint.
- Information that helps the user to accept the new viewpoint smoothly.

As previously mentioned, the analysis of human behavior in actual purchase activities shows that the supports for conception and conviction are both important to help the customer in purchasing as concept articulation. S-Conart attempts to achieve these two types of support using the following approach.

Support for conception with spatial-arrangement style of presentation The find ings from the study of creativity support suggest that the spatial-arrangement style of information presentation is useful for facilitating the customer's conception.[3,9] Therefore, S-Conart implements the support for the customer's conception using spatial-arrangement style of information presentation based on the Multi-Dimensional Scaling Method (MDS).

Support for conviction using scene information The information on image and/ or scenes of the products in use (herein called scene information) has proven to be effective in the concept articulation process.[4] Therefore, S-Conart implements the support for the customer's conviction, presenting scene information suited for the user's current thought to facilitate his/her concept articulation.

3.2 System Overview of S-Conart

The goal of this study is to investigate the impact of online-shopping system's interface on the consumers' purchase behavior, especially decision-making for item selection. Comparative control experiments will be performed from various aspects on how and what information should be presented to consumers. Currently, an experiment is being done to compare two kinds of interfaces, i.e. *spatial arrangement* and *listing*. Each of Fig. 3 and Fig. 4 shows one of screens of our experimental online-shopping system called S-Conart (Concept Articulator for Shoppers). At this moment, this system deals only with Japanese sake as product items and the experiment creates and uses a database consisting of 12 attributes and 193 kinds of sake data.

3.3 Communication Patterns in Online Shopping

The authors first conducted user study to examine the effect of the spatial-arrangement style of information presentation. This section describes the content and result of the user study. The effect of verbal presentation of scene information is currently under consideration and will be reported as soon as it is concluded in the future.

A comparative experiment on eight subjects with a product selection assignment was conducted to examine the difference in human cognitive processes
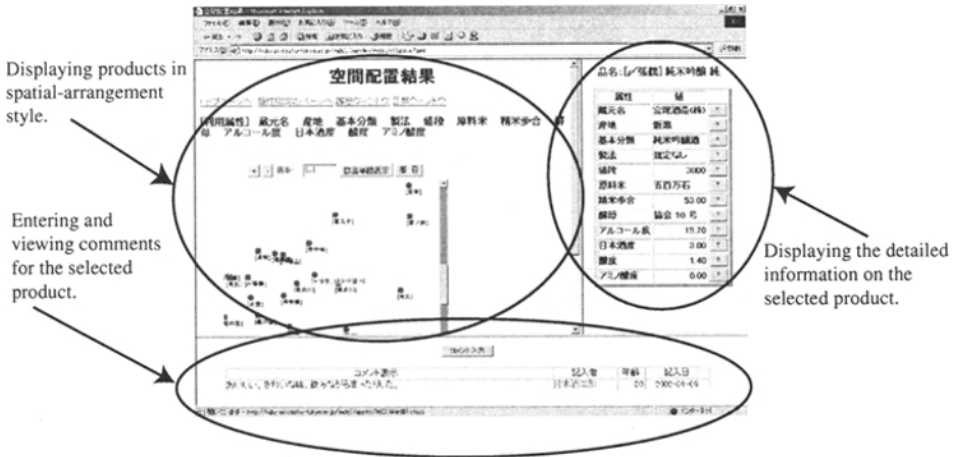
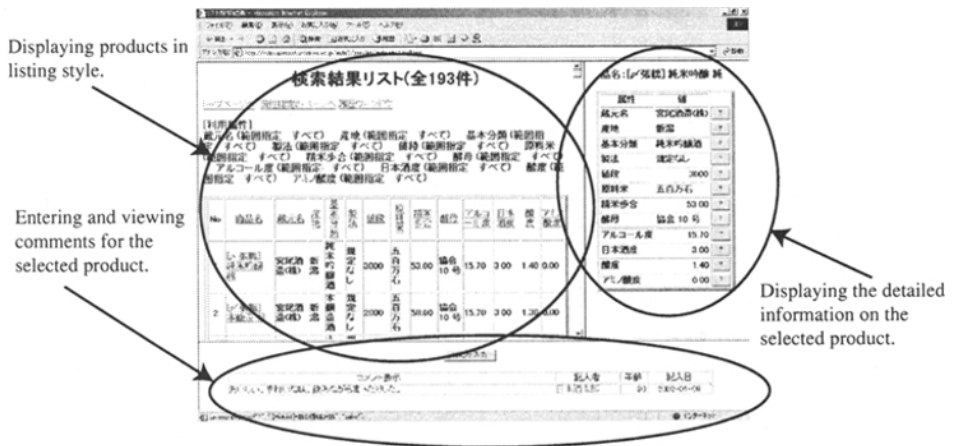**Fig. 3** Spatial-Arrangement Style Interface of S-Conart

Fig. 4 Listing Style Interface of S-Conart

when using the spatial-arrangement style interface to indirectly present the relationship among the product items and when using the listing style interface to present the product items in the list.[8]

The subjects were given a document describing the content of the experiment and assignment and then performed their experiment following the given procedure. Two kinds of assignments were prepared, and each subject did one assignment using the listing style interface and the other using the spatial-arrangement style interface. What happened during these assignments was shot with a video camera. When the subjects were interviewed regarding their assignments, they were shown this video and their operation history stored in the system. In the interview, they were asked for detailed explanation about why they performed each operation and what they had in their mind at that time. What they said was recorded and used for the protocol analysis.
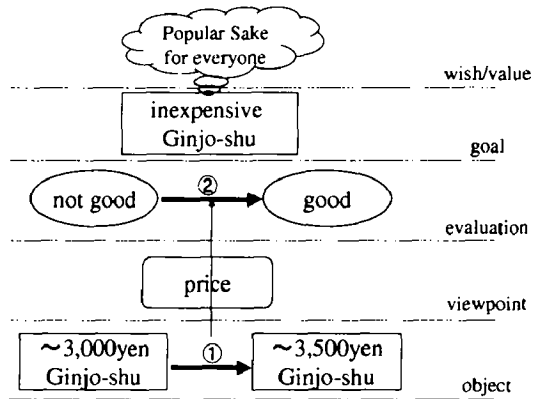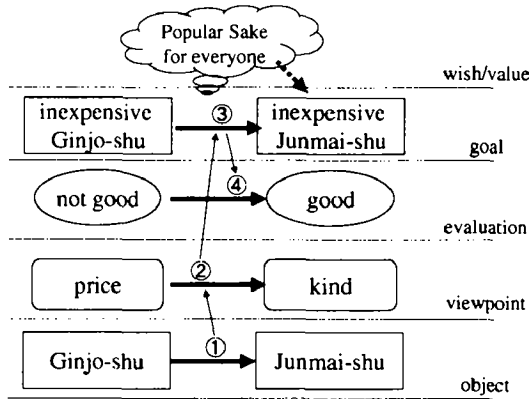
Fig. 5 Changes in the user's mental world #1: Problem-
solving type of shopping:

i) The user is looking for an inexpensive Ginjo-shu because he/she thinks a popular
Japanese sake is appropriate for the occasion. The current item under consideration
is "Ginjo-shu not exceeding 3,000 yen," however, the user judges that few items
meet his/her requirement. ii) The user loosens the restriction on price into "not
exceeding 3,500 yen" and makes a new search for the proper item (① in this figure).
iii) A matching item is found among "Ginjo-shu not exceeding 3,500 yen" (② in this
figure) and then, the user buys it.

The findings from the protocol analysis are summarized as follows: The
user trying to select desired product items usually first makes a plan for what
items should be selected in what policy. When the requirements are clear, a clear
plan is easily determined, in many cases, however, the plan is revised by trial
and error through the interaction with the system. When a clear plan cannot
be made, a tentative plan is made and used for the search, then revised based
on the search result. Therefore, the user's decision-making process as a whole
often repeats a cycle consisting of planning, action, evaluation, determination,
reconsideration, and so forth to gradually approach a more satisfactory candidate
(product item). A number of problem-solving type of purchase processes realized
by the iteration of *expected reactions* and their corresponding revision requests
were observed in human behavior in the actual purchase activities, however, it
is interesting that similar characteristics were found also in our online shopping
experiment (as shown in Fig. 5).

On the other hand, the phenomena similar to the concept-articulation
type of purchase realized by *unexpected reactions* observed in the human behav-
ior in the actual purchase activities were also observed in the decision-making
process analyzed from the experiment result. For example, as shown in Fig. 6, in
the experiment conducted by one of the subjects using the spatial-arrangement
style interface, s/he originally tried to make a search with a goal of "Ginjo-
shu*¹ from northern regions at a reasonable price." S/he used the focusing
functionality to balance matching product data with each other. If it were an

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*¹ Ginjo-shu is a quality sake brewed from the finest rice.

Popular Sake
for everyone
wish/value

| inexpensive Ginjo-shu | ③ → | inexpensive Junmai-shu | goal |

not good — ④ → good   evaluation

| price | ② → | kind | viewpoint |

| Ginjo-shu | ① → | Junmai-shu | object |

Fig. 6 Changes in the user's mental world #2: concept-articulation type of shopping:

i) The user is looking for an inexpensive Ginjo-shu because he/she thinks a popular Japanese sake is appropriate for the occasion. After considering some Ginjo-shu brands, the user judges that few items meet his/her requirement, and thinks Ginjo-shu brands are expensive. ii) A different kind of Japanese sake is found near the cluster of Ginjo-shu brands currently under consideration, and viewing it shows that it is a Junmai-shu (① in this figure). iii) The user's viewpoint is changed from price to kind (② in this figure). iv) The user decides that Junmai-shu is also appropriate as a "popular Japanese sake" and changes his/her search goal into "Junmai-shu not so expensive" (③ in this figure). v) A matching item is found among Junmai-shu brands (④ in this figure) and then, the user buys it.

expected reaction, this balancing would result in narrowing down candidates or relaxing conditions (Fig. 5). According to this subject's remarks, however, while s/he was looking at the items colored orange in the focused view, the item (colored blue), not corresponding to the current view, caught his/her attention, then clicking it to view the data proved it to be the Junmai-shu[*2] which s/he was inclined toward, and then, s/he chose to try another focused view for Junmai-shu (Fig. 6). That is, something which caught the subject's attention affected his/her mental process to cause the plan to be changed.

And, an examination of protocol data for all the eight subjects revealed that this kind of plan change triggered by *another item catching the subject's attention* occurred frequently only when using the spatial-arrangement style interface. The detailed analysis of this result is given in our paper appeared in *Strategic Knowledge and Concept Formation III* in 2001.[8]

3.4 Toward Creative Communication for Chance Discovery

The result of the user study verifies that the spatial-arrangement style of information presentation is useful as a trigger to change the user's mental world. Further, this result suggests that changing the content and/or presentation method of information provided by the system can bring a corresponding change to the human mental world, although it is in a different form from the

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[*2] Junmai-shu is a sake brewed from the pure rice.

human interaction.

The mental leap caused by "something that happens to be noticed" may seem to be an accidental phenomenon, however, does not always occur by chance. Everything which comes to our eyes is not always visible, that is, none of the things are truly visible until the customer's underlying consciousness is activated. It is similar to the fact that the customer's mental leap does not occur without appropriate information provided by salesclerks in a timely manner even when they make an unexpected reaction to their customer in the actual purchase scenes. This unexpected reaction is a chance discovery by the salesclerks (that is, to find an opportunity for selling), whereas the effect of "something that happens to be noticed" in the spatial-arrangement style interface suggests the possibility of chance discovery by customers themselves, which is expected to be useful for building the support system for the concept-articulation type of shoppers.

The authors assume that in the future we need to make more detailed analysis on what characteristics of the spatial representation caused the user's mental world to be changed in what way. And, making various devices to the listing representation as well as the spatial representation is expected to cause the user's mental world to be effectively changed. This point also needs to be examined. Sufficient analysis of how changing the information representation can change human mental world has not yet been made. Knowledge about this problem is being gradually accumulated from the studies by various researchers including us. The goal of our study is not to build up the current S-Conart system but to use it to examine human mental process and continue to make improvements on the system that reflects the result of the examination. We ourselves would like to explore the interaction design desirable in terms of concept formation through this iteration.

§4   Conclusion

This study has considered an information presentation method to help customers make a concept-articulation type of purchase when they only have vague image of what they want, and created S-Conart as one of its enabling systems. We started with observing human behavior in the actual purchase activities and found that appropriate information given by the salesclerk in a timely manner often causes the customer's focus to be diverted leading to the change of their search goal itself. And, this interaction proved to be effective in decision-making for the concept-articulation type of purchase. Then, this study created a system called S-Conart to support the concept-articulation type of purchase based on the knowledge acquired from the analysis of human behavior in the actual purchase activities. This paper described the system configuration and interaction design of S-Conart, and introduced the result of the case study conducted using S-Conart. The result of this case study verifies that the spatial-arrangement style of information presentation is useful as a trigger to change the user's mental world. Further, this result suggests that changing the content and/or presentation method of information provided by the system can bring an

equivalent change to the human mental world, although it is in a different form from the human interaction.

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