Evaluating the Effects of the Conversation Media on the Representation Elements of Architectural Design for Improving User Participation

تقييم أثر وسيلة الحوار على عناصر التصميم المعماري من أجل تحسين مشاركة المستخدم

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Abstract

This paper evaluated the use of Three-dimensional (3D) Computer Visual (CV) media vs. Two-dimensional (2D) traditional Visual (TV) media as a conversation media on the representation elements of architectural design for improving user participation in the early stages of the design process. A qualitative experimental approach was adopted in this study. Data was collected from conversational dialogues between an architect and a list of clients. The results revealed that the 3D CV media was shown to be more supportive than 2D TV media in exploring representation elements and therefore to enhance the user participation. In addition, it reveals that the more complex the representational element, the greater the impact of 3D CV media compared to 2D TV media on user participation.

Keywords: Conversation Media, User participation, Representational Element.

ملخص

هذه الورقة تقيم أثر استخدام وسائل الحاسوب البصرية ثلاثية الابعاد مقارنة يالوسائل التقليدية ثنائية الابعاد كوسيلة حوار في عملية التصميم المعماري من أجل زيادة مشاركة المستخدم في المراحل الاولى لعملية التصميم. تم تبني المدخل الموضوع التجريبي كوسلة بحث في هذه الورقة. البيانات تم جمعها من خلال اجراء حوار بين مهندس معماري مع مجموعة من الزبائن. كشفت النتائج أن وسائل

الحاسوب ثلاثية الابعاد كانت اكثر دعما من الوسائل التقليدية ثنائية الابعاد في تحسين مستوى مشاركة المستخدم خاصة في التعبير عن عناصر التمثيل المعماري . كما وكشفت الدراسة انه كلما زاد مستوى التعقيد في عناصر التمثيل المعماري زادت أهمية وسائل الحاسوب ثلاثية الابعاد

الكلمات المفتاحية: وسائل الإعلام المحادثة، مشاركة المستخدم، العنصر التمثيلي.

Introduction

Many researchers have studied the design process from a social constructivist perspective (Bucciarelli, L.L.; Lloyd, P.; Luck, R.; Oak, A.). Sociality means the tendency to associate with others. The design activity, as a social process, is frequently performed between two parties or more. (Luck, R.) states that the most obvious reason why design is considered to be social is because design is often carried out as a collaborative activity, wherein the design can be realised in conversations and actions. She also states that to achieve a better understanding of everyday design practice, real design conversations should be examined. The architect–client design conversation provides a detailed description of what is happening in the design process. Design can be seen as an outcome of a series of negotiations between designers and clients or between the designers themselves (Tomes, A., C. Oates & Armstrong, P.).

Therefore, an analysis of the architect–user conversation is an approach that can be employed to reveal the level of user participation (Luck, R.) in any stage of the design process. Very early conversations between the architect and user-client are reported in this paper to elucidate the effect of the conversation media on user participation in the early stage of the design process. Focusing on the role of negotiation between architects and clients generates much of the discussion regarding user participation in the architectural design process (Tomes, A., C. Oates, & Armstrong, P.); (Sanoff, H.) states that one of the core values of user participation is that the users should have a say in the actions that affect their environment, therefore the conversation between the user and architect is crucial to meeting their needs. The decision-making process as well as understanding the designed objects emerges owing to the information exchanges between the architect and user. Accordingly, the architect–client conversation is regarded as integral to the involvement of both parties in making design decisions.

Therefore, in this study the researcher utilises the talk-in-interaction as a means to measure the level of user participation during individual early design conversations between an architect and 12 clients based on the media used in the conversation.

Methodology

There is a need in this study to use qualitative strategies to explore the clients' experiences and perceptions of participation in the design of their house when using 3D CV media as opposed to 2D TV media. It was necessary to compare the effect of using the two-different media by analysing the responses of two different groups of individuals. Here, the interest lies in the effect of the intervention, namely of 3D CV media, on some object, which is client participation, and this is the definition of the experiment. (Moerbeek, M., G.J.P. van Breukelen, & Berger, M.P.F.) define an experiment as a process that is implemented to ascertain the impact of two different treatments, an intervention and a control, on the outcome variables of individuals.

In light of the foregoing, the qualitative experiment approach was adopted in this research to combine the concept of the experimental design with the needed qualitative strategies. (Robinson, S. & Mendelson, A.L.) define a qualitative experiment as "a hybrid methodological technique that fuses elements of experimental design with qualitative strategies". They state that this strategy uses qualitative approaches such as the in-depth interview to assess the differences in the reactions between individuals in groups subjected to different conditions, a technique that is typically associated with experimental research. They found that a qualitative experimental design could expose the different experiences of people after they had viewed media content in different formats.

Therefore, a qualitative experimental approach (Robinson, S. & Mendelson, A.L.) was adopted in this study to collect and analyse the data. The qualitative experimental design is able to disclose the different experiences people have after viewing media content in different formats (Ahmad Saleh, A.R., Peter Woods, Xin Li, Ihab Hijazi, & Chengc, S.). In light of this, a conversational dialogue between an architect and a client was used as a strategy of the qualitative approach to assess the participation behaviour

of clients in designing their houses in the early stages by using two different versions of media under an experimental design conditions.

Twelve conversations between an architect and individual users or clients were conducted in the early stage of a house design process in order to reveal the impact of using 2D TV media and 3D CV media. Only 2D TV media was used for six of the conversations, while only 3D CV media was used for the other six. The participants for this stage of the research were selected from the lecturers of the Multimedia University in Malaysia. An invitation letter to participate in an interview was emailed to 200 different lecturers from the university lecturer list. The invitation letters were sent in batches at a rate of 50 invitations every time because, as with the first stage of the study, the researcher was not able to determine the exact number of participants who would be interviewed because the collection of data ceases only at the saturation point (Strauss, A.L. & Corbin; J.M. Strauss, A.L. & Corbin, J.M.; Glaser, B. & Strauss A.; Saumure, K. & Given L.M.). The saturation point became evident after conducting 12 conversations, which coincided with sending out 200 invitations through email. This also enabled the researcher to assign the participants into two groups following the matching approach. In order to control the variables that might influence the outcomes, (Creswell, J.W.) states that: "One approach is matching participants in terms of a certain trait or characteristic and then assigning one individual from each matched set to each group". Therefore, the researcher assigned the participants into two matching groups. The criteria for matching was sex, age, specialization, number of the family members, level of education, and race, as shown in Table 1.

Table (1): Participants' information.

	2D TV Conversations	**3D CV Conversations**
Sex	Four males and two females	Four males and two females
Age	Range between 35 and 39	Range between 34 and 38
Education	Three PhDs & three Masters	Two PhDs & four Masters
Race	Three Malay, one Arabian, one Chinese, and one Bangladeshi	Three Malay, one Arabian, One Japanese, and one Indonesian
No. of family members	Range between 4 and 6	Range between 3 and 6

The use of two different media enables the researcher to compare the participation behaviour of the users from the two different groups in early design conversations. The aim of this study is to gain insight into the influence of 3D CV vs. 2D TV media on the interaction and information exchange between the architect and the user in terms of the representation elements of architectural design. In this way, the researcher can analyse the activities of the design process as they take place between the architect and the user in real practice. Some extractions of the conversational dialogue are presented in the following sections. Abridged version of the transcription notation system developed by Gail Jefferson (Atkinson, J.M. & Heritage, J.) was used to transcribe the conversational dialogue.

Representation Elements of Design

By analysing the ideas and the information exchanged between the architect and the client in the early design conversation, some aspects and elements of the design that were represented by both of them through the conversations can be recognised. The purpose here is to reveal the effects of the conversation medium on these aspects and elements of design and to better understand the influence these effects have on user participation in the early stage of the design process. To identify these aspects and elements, (Medway, P.) framework, 'representation elements of design' was adopted in

this research. (Medway, P.) recognises four representational elements of design that feature in the written and spoken discourse of architecture. (Luck, R. & McDonnell, J.) use an extension of the same four representational elements of design identified by Medway to analyse the information exchanged in a conversation between an architect and a building user. (McDonnell, J.) again adopts the same framework of representation elements of design to express the users' requirements. These four representational elements of design are:

1. Structural and functional realities: architectural elements (door, room, wall, floor, etc.) and generic or specific functions (circulation, kitchen, study room, etc.) of the building or space.

2. Perceptual awareness: attributes of the building or space that the viewers can perceive (visual, lighting, acoustics, etc.). Here, it is a matter of what things can be perceived against what is hidden and how the order of these things.

3. Phenomenological experience or meaning: feelings and associations provoked in the viewer when experiencing the architectural condition (sense of density, solidity, containment, etc.). Here, it is a matter of interpretation or meaning.

4. Symbolic meaning: evocation of ideas which are unrelated to the structural forms (mystery, memory, etc.).

According to (Medway, P.); (Luck, R. & McDonnell, J.), these four representational elements reveal different levels of complexity and understanding of a space. The first level is related to the structural/ functional aspects and the other three levels are related to experiential aspects, namely perception and two types of meaning: phenomenological meaning and symbolic meaning, which are the most complex and interesting. The impact of using 2D TV media and 3D CV media on each of these four representational elements of design in the early design conversation is discussed in the following subsections.

Structural and Functional Realities

As mentioned above, the structural and functional realities are architectural elements and generic or specific functions of the building or space. Some examples of the structural and functional realities that were represented either by the architect or the clients in the 2D TV conversations and 3D CV conversations are shown in Table 2 (see the underlined words). As shown in this table, the clients and the architect used structural and functional realities to represent their ideas and information as elements of design. For the structural elements, they used many terms such as floor, wall, window, awning, etc. For the functions, they used some specific functions such as master bedroom, guest room, kitchen, etc. and some generic functions such as cooking activities and space.

Table (2): Experimental Results of Uniform Random.

Conv. No	Structural and functional realities	Represe-ntational element	Architect / Client	Media
Conv.5	P5: The living room should be as normal, near the main door.	Generic function, structural element	Client	2D TV
Conv.7	P7: This is the formal sitting area for the guests ……………..	Generic function	Client	3D CV
	A: No it is a window. If you would like we can make it a door.	Structural element	Architect	

The number of structural and functional realities that were used either by the architect or the client in the 2D TV and 3D CV conversations was examined. In fact, almost every line of the conversations contained a structural or a functional element. Therefore, for the purposes of this part of the research it was good enough for the researcher to take account of only one structural and one functional element when mentioned for the first time in

each segment for all conversations. So, the number of the structural and functional realities was approximately equal to the number of segments in the conversations.

Figures 1 show a comparison of the average number of structural and functional realities that were mentioned in the 2D TV conversations and the 3D CV conversations. It can be clearly seen that the number of structural and functional realities in the 3D CV conversations was higher than that in the 2D TV conversations. In the 2D TV conversations, the number of structural and functional realities ranged from 10 to 22, and the average was 15.33. For the conversations that adopted 3D CV media, the number of structural and functional realities ranged from 16 to 33, and the average was 23. The average number of structural and functional realities mentioned in the 3D CV conversations was 7.67 more than the average number of contributions in the 2D TV conversations.
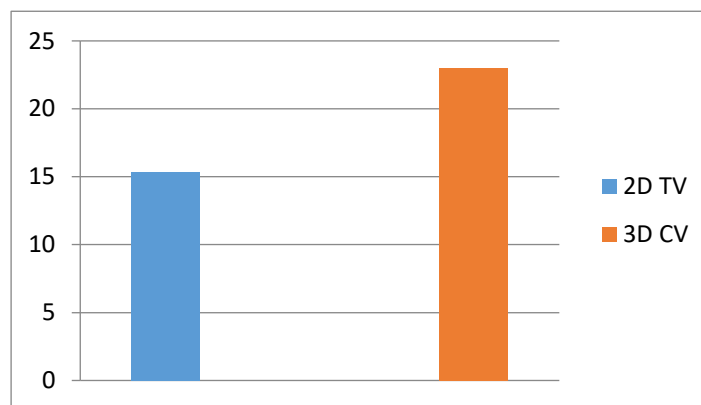

Figure (1): Average number of structural and functional realities in 2D TV and 3D CV-based conversations.

Perceptual Awareness

Perceptual awareness is another significant design element (Medway, P.). states that realising the architectural experience is another demand imposed on the architectural design other than structural elements meeting required

functions. The viewers' perception is one of the experiential aspects of the architectural design element that was investigated in this study in terms of the impact of the conversational medium. Perceptual awareness relates to the attributes of the building or space that the viewers can perceive (visual aspects, lighting, acoustics, etc.). It is related to how the viewers can be aware perceptually of the aspects of the building and their order.

Some examples of perceptual awareness that were demonstrated by either the architect or the clients in the 2D TV conversations and 3D CV conversations are shown in Table 3 (see the underlined words). As shown in this table, the clients and the architect used perceptual awareness to express their experiences about the architectural design. For example, in conversation 4, the client described his doubts about the light attribute of the kitchen. He used the term "very dark" to express his experience and worries about what would happen if the kitchen were closed in. The other examples in this table relate to when 3D CV media was used. The client in conversation 9 was also concerned with a visual attribute, in this case of the kitchen in relation to the living room. The interior 3D model helped him to experience the visual relation between the kitchen and the living room. He thought that the kitchen should not be seen from the living room. He was anxious that guests would be able to see what was going in the kitchen.

Figures 2 show a comparison of the average number of perceptual awareness elements that were demonstrated in the 2D TV conversations and the 3D CV conversations. It can be clearly seen that the number of perceptual awareness elements in the 3D CV conversations was higher than that in the 2D TV conversations. In the 2D TV conversations, the number of perceptual awareness elements ranged from seven to 14, and the average was 9.83. For the conversations that adopted 3D CV media, the number of perceptual awareness elements ranged from 12 to 31, and the average was 20.16. The average number of perceptual awareness elements in the 3D CV conversations was 10.33 more than the average number of perceptual awareness elements in the 2D TV conversations.

Table (3): Examples of perceptual awareness.

| Conv. No	Perceptual awareness	Represen- tational element	Architect / Client	Media
Conv.4	P4: So, if you <u>closed</u> this it would be <u>very dark</u> for the kitchen here - you have a window - right?	Light attribute	Client	2D TV
Conv.9	P9: Because kitchen should not be <u>facing</u> the living room, the kitchen should be <u>hidden from</u> the guest. - Also, when you do cooking activities, the outsiders do not <u>need to see</u> what we do in the kitchen.	Visual attribute	Client	3D CV
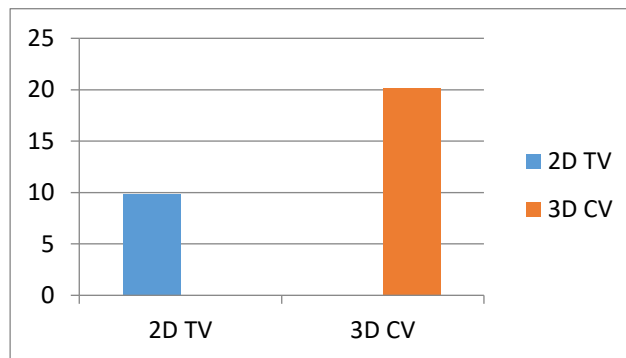
Figure (2): Average number of perceptual awareness elements in 2D TV and 3D CV-based conversations.

Phenomenological Experience or Meaning

Viewers interpret the aspects of the building and the architectural condition that they experience as feelings and associations. They express these feelings and associations in terms of sense, such as sense of density, wetness, dryness and strength. Some examples of the phenomenological experience or meaning that were demonstrated by either the architect or the clients in the 2D TV conversations and 3D CV conversations are shown in Table 4 (see the underlined words). As shown in this table, the clients and the architect used the phenomenological experience or meaning to express their feelings about and associations with the architectural design. For example, in conversation 3, the client expressed his feeling that the garage was competing with the house after he saw the 2D plan. He tried to interpret his feeling of the exaggerated importance that was given to the garage by describing it as if it were another house even though in reality it was not that large. In the second example (conversation 7), the use of the term 'focal point' expresses the client's feelings about the importance of the dining room. The client used the 3D view to describe her experience of how the dining room was important for the house as if it were the focal point.

Table (4): Examples of phenomenological experience or meaning.

Conv. No	Phenomenological experience or meaning	Represent-ational element	Architect / Client	Media
Conv.3	P3: I don't want to do another house for my car - so within my house I would like to expand the balcony so it will be the roof over my parking.	Sense of competitive importance	Client	2D TV
Conv.7	P7: So here many people see the dining area as the focal point because - can you scroll down the view?	Sense of focal point	Client	3D CV

The impact of using 2D TV media or 3D CV media on the expression of phenomenological experiences or meanings was investigated to reveal its impact on user participation. Figures 3 show a comparison of the average number of phenomenological experiences or meanings that were expressed in the 2D TV conversations and the 3D CV conversations. It can be clearly seen that the number of phenomenological experiences or meanings in the 3D CV conversations was higher than that in the 2D TV conversations. In the 2D TV conversations, the number of phenomenological experiences or meanings ranged from zero to six, and the average was 2.16. For the conversations that adopted 3D CV media, the number of phenomenological experiences or meanings ranged from one to eight, and the average was 4.16. The average number of phenomenological experiences or meanings when 3D CV media was used was almost twice as high as when 2D TV media was used. Therefore, the clients as well as the architect were more able to express their phenomenological experiences when they used 3D CV media than when they used 2D TV media.
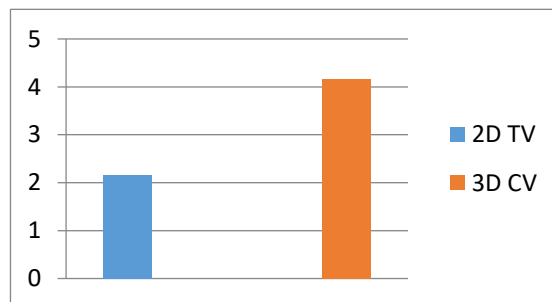
Figure (3): Average number of phenomenological experiences or meanings in 2D TV and 3D CV-based conversations.

Symbolic Meaning

Symbolic meaning is the most complex element of the four representational elements. While phenomenological meanings are related to the spatial condition and physical aspects, symbolic meanings denote the ideas that are evoked in the mind of the viewer but which are unrelated to the structural form. These symbolic meanings can take the form of memories, mysteries, hobbies and ambitions. Some examples of the symbolic meanings

that were mentioned by either the architect or the clients in the 2D TV conversations and 3D CV conversations are shown in Table 5 (see the underlined words). The first examples were mentioned in the 2D TV conversations while the second example was mentioned in the 3D CV conversations. In the first example (conversation 1), the client referred to the symbolic meaning of aging in relation to himself and his parents. He began to imagine himself as becoming too old to use the stairs; therefore, he expressed his desire to have a spare bedroom on the ground floor for that time. This aging symbolism is a meaning that has nothing to do with the structural form, rather it is related to the imaginings of the speaker about his future. In the second example (conversation 10), the client raised the symbolism of ambition; he talked about the hobbies and dreams of his children in relation to what they might do in the future, which symbolizes ambition and hope.

Table (5): Examples of symbolic meaning.

Conv. No	Symbolic meaning	Representational element	Architect / client	Media
Conv. 1	P1: But sometimes if you are <u>aged</u> you maybe can't go upstairs to the first floor. - So, I need a spare bedroom. Also, <u>it can be used by my parents when they visit me - If I aged then I can use it.</u>	Aging symbolism	Client	2D TV
Conv. 10	P3: Ok, I want to personalize the design according to my kids. <u>Some of them are the outdoor (type) like my third son. He likes to jump and to do sport activities, - some of them like gardening - and some of them like to do indoor experiments and artistic works</u>	Hope and ambition symbolism	Client	3D CV

The impact of using 2D TV media or 3D CV media on symbolic meaning was investigated to reveal its impact on user participation. Figures 4 show a comparison of the average number of symbolic meanings that were raised in the 2D TV conversations and the 3D CV conversations. It can be clearly seen that the number of symbolic meanings in the 3D CV conversations was higher than that in the 2D TV conversations. In the 2D TV conversations, the number of symbolic meanings ranged from zero to three, and the average was 1.16. For the conversations that adopted 3D CV media, the number of symbolic meanings ranged from one to seven, and the average was 3.66. The average number of symbolic meanings when 3D CV media was used was more than three times as high as when 2D TV media was used. Hence the impact of using 3D CV media compared with 2D TV media was most obviously greater for this kind of representational element.
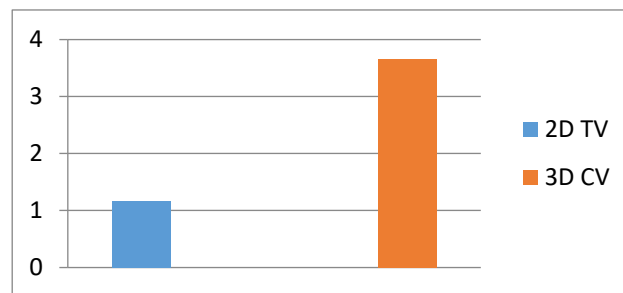

Figure (4): Average number of symbolic meanings in 2D TV and 3D CV-based conversations.

Discussion

The above results demonstrate the impact of using 2D TV media and 3D CV media on each of the four representational elements of design in the early design conversation. The structural and functional realities were the most frequently used of the four elements in both the 2D TV conversations and the 3D CV conversations. Perhaps this is because, as (Medway, P.) states, this level is not as complex as the other three levels. Moreover, the terms for the architectural elements (window, wall, etc.) and the terms for the functions (circulation, living room, etc.) are very usable terms in the clients' daily life. The results showed that the number of structural and functional realities in

the 3D CV conversations was higher than in the 2D TV conversations. Thus, 3D CV media supported the use of structural and functional realities more than 2D TV media.

The study also examined the number of perceptual awareness elements that were mentioned by the architect or the client in the 2D TV and 3D CV conversations. The results showed that the number of perceptual awareness elements in the 3D CV conversations was higher than that in the 2D TV conversations. Therefore, the clients as well as the architect were more able to express their perceptual awareness when they used 3D CV media than when they used 2D TV media. Therefore, clients' ability to participate in the early stage of the design process was greater when 3D CV media was adopted.

Furthermore, the number of phenomenological experiences or meanings that were raised by the architect or the client in the 2D TV and 3D CV conversations was also examined. Clients expressed these feelings and associations in terms of sense such as sense of density, wetness, dryness and strength. Phenomenological experience is considered to be more complex than the two aforementioned elements. Therefore, its frequency of appearance in the conversations was lower than the first two representational elements. The results demonstrated that the number of phenomenological experiences or meanings in the 3D CV conversations was higher than that in the 2D TV conversations. Therefore, the ability of the clients to express their phenomenological experiences and in turn to participate in the early stage of the design process was greater when 3D CV media was adopted as a facilitator of the early design conversations.

Finally, the number of symbolic meanings that were mentioned by the architect or the client in the 2D TV and 3D CV conversations was examined. The results showed that among the four representational elements, symbolic meanings were mentioned the least in the conversations. This might be because symbolic meaning is the most complex element of the four representational elements. The results showed that the number of symbolic meanings in the 3D CV conversations was higher than that in the 2D TV conversations. Therefore, the clients as well as the architect were more able to express their symbolic meanings when they used 3D CV media than when they used 2D TV media. Therefore, clients' ability to participate in the early

stage of the design process was greater when 3D CV media was adopted as a facilitating medium in the early design conversations.

In light of the foregoing, it is very clear that 3D CV media was more supportive than 2D TV media in eliciting the four representational elements from both the clients and the architect. The extent of this effect of the 3D CV media varied from one element to another. Figure 5 shows that the more complex the representational element, the greater the impact of 3D CV media compared to 2D TV media. In other words, the role of 2D TV media in enabling the viewer to express representational elements weakens when the complexity of the representational element increases, whereas the role of 3D CV media strengthens when the complexity increases.

However, even though 3D CV media was shown to be more supportive than 2D TV media in exploring structural and functional elements, the difference between the two media was not as significant in this case as it was for the other representational elements, especially symbolic meanings. This means that it is more important to use 3D CV in the early stage of the design process to enable the client to express complex feelings and experiences than to encourage them to express simple and normative elements. In the early stage of the design process, the need to explore the feelings, experiences and meanings to characterize the identity of the building is greater than the need to explore the structural and functional elements which are important in the final stages. Therefore, the usage 3D CV media to reveal these feelings and meanings should be greater when the design is in the earlier stages. Thus, it can be concluded that using 3D CV in the early stage is more essential than 2D TV to increase the involvement of the user because it allows the user to better express a range of feelings and experiences.
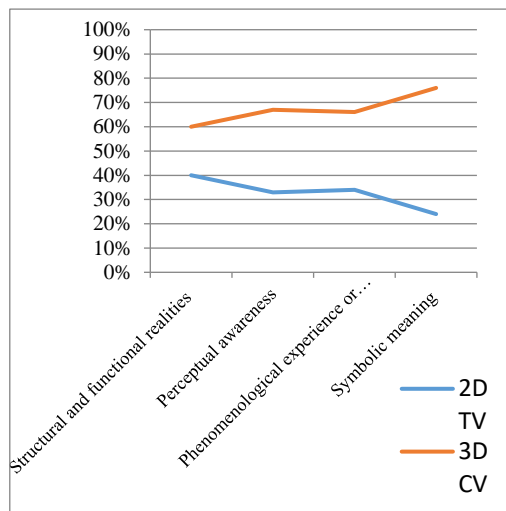
Figure (5): Relation between complexity of representational elements and the use of 2D TV and 3D CV media

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