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**INTEGRATING HUMOUR INTO A DESIGN METHODOLOGY BASED IN GENERATIVE QUESTIONS (QUCHANE) FOR UNBLOCKING CREATIVITY. STUDY CASE: UNIVERSITAT JAUME I.**

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Previous studies have demonstrated that humour as external stimulus, applied before the idea generation phase, leads to more creative results. This paper explores how to integrate humour into the design method itself, beyond using it as an external factor, with the aim of encouraging creativity. For this reason, the set of generative questions QuChaNe has been chosen as a design method. The guidelines identified to integrate humour are: selection of a humorous theme that fits with the design method and the designers, obtaining the unexpected and transforming the serious requirement foreseen into a humorous one, keeping the intention. Considering these guidelines, a new version of the QuChaNe questions has been generated. The study compares the creativity, understood as the combination of novelty, usefulness and feasibility, of the final ideas obtained when applying the original set of questions with the questions with the integrated humour. The results point to more novel results when humour is integrated, but less feasible, leading to no significant differences in creativity in general, although it would be interesting to replicate the experiment with other humorous themes in different populations in order to make the conclusions more robust.

Keywords: Humour; creativity; idea generation; conceptual design; unblocking

**INTEGRACIÓN DEL HUMOR EN UNA METODOLOGÍA BASADA EN PREGUNTAS GENERATIVAS (QUCHANE) COMO DESBLOQUEO CREATIVO. CASO DE ESTUDIO: UNIVERSITAT JAUME I.**

Estudios previos demuestran que el humor como estímulo externo, aplicado antes de la fase generativa de ideas, da lugar a resultados más creativos. Este trabajo explora cómo integrar el humor en el propio método de diseño, más allá de utilizarlo como un factor externo, con el objetivo de fomentar la creatividad. Para ello se ha elegido como método de diseño el conjunto de preguntas generativas QuChaNe. Las pautas identificadas para integrar el humor son: selección de un tema humorístico que encaje con el método y los diseñadores, obtención de lo inesperado y transformación del requisito previsto en uno humorístico, manteniendo la intención. Considerando estas pautas, se ha generado una nueva versión de las preguntas QuChaNe. En el estudio se compara la creatividad, entendida como la combinación de novedad, utilidad y factibilidad, de las ideas finales obtenidas al aplicar el conjunto de preguntas original con las modificadas para integrar el humor. Los resultados apuntan a unos resultados más novedosos cuando se integra el humor, aunque menos factibles, lo que lleva a no percibir diferencias significativas en la creatividad en general, si bien sería interesante replicar el experimento con otros temas humorísticos en poblaciones diferentes para darle mayor robustez a las conclusiones.

Palabras claves: Humor; creatividad; generación de ideas; diseño conceptual; desbloqueo

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## **1. Introduction**

Creativity is one of the main factors to consider in design engineering. Consequently, the creativity of designers and the design process have often been subject of research (Amabile, 1996; Csikszentmihalyi, 1998). Research on creativity includes, but it is not limited to the development of design methods that drive to more creative ideas (Bonnardel & Didier, 2020; Mesquita, 2011; Moorcroft, 2007). Moreover, this research is not limited to design methods. There are a lot of factors that can influence the creativity of designers, like social factors (Dallman et al., 2005), cultural factors (Erez & Nouri, 2010) environmental factors (Chulvi et al., 2020), and the use of new technologies (Mulet et al., 2016) among others.

As there are factors that enhance creativity, there can also be mental blockages than work against it (Groth & Peters, 1999). At this point, there is also considerable research in the way of “breaking” these blockages, like the use of alcohol to disinhibit (Norlander, 1999), the use of “mindless work” for breaking the routine (Elsbach & Hargadon, 2006), reaching positive mood (M. A. Davis, 2009; Vosburg, 1998), or the use of sense of humour (De Napoli et al., 2018).

### **1.1 Creativity in Engineering Design**

Creativity in design must first be born in our head and then emerge in reality through a process, to end up in a defined concept (Ferrer, 1997). Therefore, it can be approached from the point of view of the designer as an individual, of the design process and of the resulting product, although the first of these, the one referring to the individual, belongs more to the field of psychology. Design methodologies are directly related to the creative process, as defined by Csikszentmihalyi (1998). In fact, numerous studies in the field have focused on analysing and assessing the creative process and not only its outcome, as is the case of Shah et al. (2003), who assess both the quantity and variety of ideas that arise from a creative process, and not only the parameters inherent to the creative product, generally defined as the combination of the novelty of the concept and its suitability to solve the defined problem (Chulvi et al., 2012).

### **1.2 Humour and creative design**

There is a lot of previous research defending the positive correlation between creativity and humour (G. A. Davis, 1999; McGhee, 1980; O’Quin & Derks, 1999). Moreover, there is also a worldwide agreement in the fact that humour aids finding more creative ideas in design teams (Zhou, C., Chemi, T., Lund, 2015). In previous research, humour has been applied as an external stimulus before the idea generation resulting in more creative results. For example, De Napoli et al. (2018) performed an experience concluding that the concepts obtained using Brainwriting combined with humorous visual stimulation reach better creativity scores than those obtained without stimulation. In this line, Zhou, (2017) uses playful climates in learning environments in order to arouse humour, fostering creativity in this way.

Nonetheless, all these research focus on causing humour by means of external agents. No studies have been found in which humour is used as an internal agent. The fact of working with a serious methodology after humour was caused can counteract the initial humorous state. For that reason, the present work proposes to integrate humour in the methodology itself. In this particular study it was decided to use the guided question model as a design methodology.

### **1.3 High level questions to drive the generation of ideas**

Questions are applied in the design process for different purposes. Several design methods, both problem analysis methods and problem-solving methods are based on question asking.

Some of the methods are, for example, the Quarantee checklist (1992), list of questions that aims to define the design problem considering all the objectives of the problem, the SCAMPER method (Eberle, 1971), or the Why Questioning Method of Lateral Thinking (De Bonno, 1970). The technique 5W+1H or the Kipling method of questions helps to identify the users, conditions, interactions and to propose a long-term scenario (Lin & Luh, 2009). Finally, the What if? method (Allan et al., 1999), as a simple way of considering alternatives by anticipating or imagining future developments (Casti et al., 2011).

Questions formulated in design stages influence design thinking (Eris, 2004). Eris (2004) developed a thinking model led by questions. According to Eris' proposal, two types of questions exist in design discourse: Low-Level Questions (LLQs) and High-level questions (HLQs), which comprise Deep Reasoning Questions (DRQs) and Generative Design Questions (GDQs). These are Generative Design Questions (GDQs) which, in this case, fall into the ideation category. Generative Design Questions are classified into enablement; method generation, proposal or negotiation; scenario creation and ideation. In scenario creation questions the questioner wishes to construct scenarios involving the question concept to investigate possible outcomes. The questioner attempts to encourage others to come up with as many ideas as possible, and not to be satisfied with either at-hand solutions or the first obvious idea that comes to mind, an example would be: "What else can we use instead of wood for this product?" GDQs extend the conceptual design space and can reframe the problem at hand (Cardoso et al., 2016).

#### **1.4 Research Question**

So, the hypothesis of present research is that humour, integrated into a design method can stimulate creativity, as it occurs when humour is used as external stimulus, applied before the idea generation phase.

## **2. Methodology**

In order to test whether the integration of humour within the design methodology itself enhances creativity, or any of the factors that compose it, the QuChaNe guided question methodology has been selected. Based on it, a methodological approach for the integration of humour in it has been proposed. A practical experience has been carried out with the two versions of the guided questions, and the results obtained with both versions have been compared in terms of creativity.

### **2.1 QuChaNe: Scenario creation questions for changing needs**

The High Level Questions selected for the methodological approach are the QuChaNe Guided Questions proposed by Royo et al. (2021). The proposed guided questions (Table 1) focus on scenario creation questions (Eris, 2004) as these questions help to promote future ideas and suggestions still not considered. Therefore, they encourage the extension of the life span of products by thinking about future user needs and avoid being discarded. They are designed to be characterised by encouraging divergent thinking and help to elicit different alternatives that move away from existing facts and think about the possibilities that can be produced from them. Using QuChaNe Guided Questions front using no-method makes that the quality of the final ideas becomes higher, even though the quantity and variety of solutions decreases (Royo et al., 2021). That is, guided questions have the advantage of allowing the designer to focus more on fulfilling the desired function, thus increasing the usefulness of their proposals.

**Table 1. QuChaNe Guided Questions (Royo et al., 2021)**

CATEGORIES		QUESTIONS
S1	Quantity and size of users	What if the number of people using the product simultaneously increases or decreases?
S2		What if user's size changes?
C1	Physical capacities	What if users' hearing/touch/visual capacities diminish?
C2		What if users have problems with their motor functions?
C3		What if users' physical capacities improve/worsen with age?
C4		What if users have different physical strengths?
C5	Psychics capacities	What if users' psychic capacities can improve/worsen with age?
C6		What if users' psychic capacities diminish?
U1	Updates, technological changes	What if technological innovations were included in the product?
U2		What if we have the need to change a component of the product that breaks down?
U3		What if new functions were added to the product?
E1	Environment	What if the product needs to be ready for being in contact with different kinds of surfaces?
E2		What if the product must prove functional in different climates?
E3		What if the product must prove functional in different habitats or places?
E4		What if the product must be understood and well accepted from different cultures?

## 2.2 Methodological approach for the integration of humour in the design methodology

In order to integrate the humour into the methodology, the first step is to look for a topic suitable for the methodology. For instance, when analysing the proposed GQ in QuChaNe, it can be seen that half of the questions are related to reduced capacities (perceptual, physical and psychological). The other categories are related to the quantity and size of users, technological changes and environment.

The topic must also be fun for the user of the methodology. The same stimulus that is fun for one individual must not be fun for another one. So, the topic should be easier to fix if we focus on a social group: junior designers or senior designer, designers for the same country or

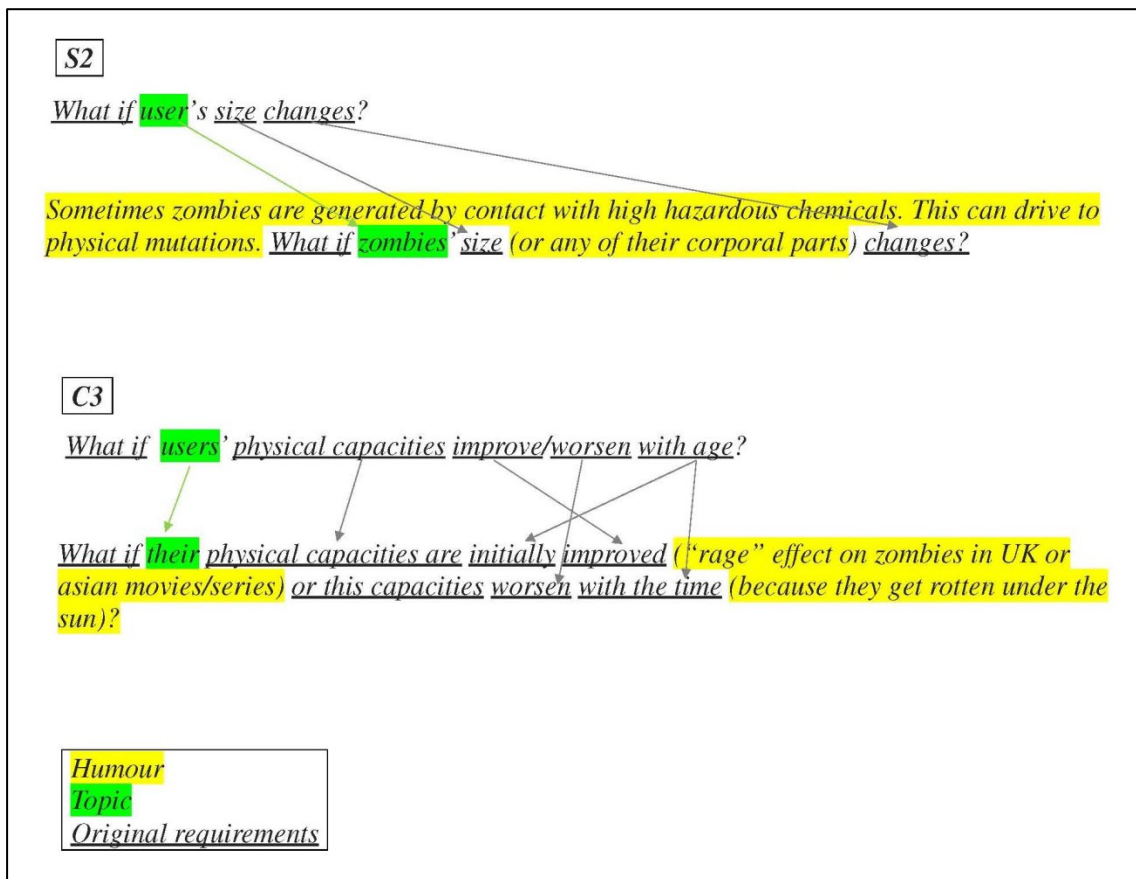
region, or even male or female designers as a group. In order to carry on with the approach, we are going to propose as a target the group of junior designers.

Moreover, the possibilities of causing humour can be increased for the use of the unexpected or the absurd (Ross, 2005). Consequently, we must have in mind that the topic must be far from the usual topics that usually face the selected group of designers.

Taking into account these three points, a topic able to present reduced capacities preserving their capacity of being fun and unexpected for a group of young designers, the proposal is to use zombies.

The next step is to transform all the questions of the proposed methodology, considering that the main sense and the requirements must not change. Figure 1 shows the transformation of questions S2 and C3, as examples. This example shows the conservation of the original requirements of the questions, the transformation of the target of the design considering the new topic, and the introduction of the humour component in the question.

**Figure 1: Example about integrating humour into QuChaNe GDQs**



### 2.3 Scenario creation questions for changing needs with humour

As a result of following the steps of the methodology proposed in the previous point on the selected guided questions, the new questions with integrated humour are as shown in Table 2:

**Table 2. QuChaNe GQs modified to include humour**

CATEGORIES		QUESTIONS
S1	Quantity and size of users	Zombies usually walk in hordes. What if a group of zombies wants to use the product?
S2		Sometimes the zombies are generated by contact with highly hazardous chemicals. This can drive to physical mutations. What if zombies' size (or any of their corporal parts) changes?
C1	Perceptual capacities	What if the zombie loses an eye, ear or some of the fingers due to its putrefaction?
C2		What if we are considering the typical zombie of USA movies/series, who have evident problems with their motor functions?
C3	Physical capacities	What if their physical capacities are initially improved ("rage" effect on zombies in the UK or Asian movies/series) or these capacities worsen with the time (because they get rotten under the sun)?
C4		What if the product must be used both by USA and UK zombies? (Slow ones and "rage" ones)
C5	Psychics capacities	What if, over time, worms go eating zombie's brains, until the worm has more brain than the zombie itself?
C6		What if when zombified, too much brain mass was eaten by the zombificator, and now he is "a bit slow"?
U1	Updates, technological changes	What if post-apocalyptic technologies were included in the product?
U2		Since when a zombie goes to the repair shop, humans tend to run away, what if an ecologist zombie wants to repair or change a component of the product that breaks down?
U3		What if new functions were added to the product to adapt it to post-apocalyptic needs?
E1	Environment	A zombie is not very meticulous regarding to where he walks. What if the product needs to be in contact with different kinds of surfaces?
E2		What if the product must prove functional in the different climates where the zombie virus extends?
E3		What if the product must prove functional in the different zombie habitats?
E4		What if the product must be understood and well accepted by zombies both from USA, UK, Asia, or any other place?

## 2.4 Development of the experience

The practical experiment was carried out with the collaboration of 22 students (8 women and 14 men) from the Master's Degree in Engineering and Manufacturing, all of them engineering graduates with no work experience, distributed in 6 groups of 3 or 4 students. The procedure used is shown in Figure 2. All students participated at the same time. They were gathered in the same room where, firstly, an explanation about the scenario creation guided questions (QuChaNe) and the Storyboard was given to them (10 min.). The storyboard (Curtis & Vertelney, 1990) was selected in the experience to facilitate the representation of the scenarios created with the GQs. They were provided with time to ask questions about the explanation and were divided into 6 teams of 3 or 4 members each. For stage one, they were given the problem statement A (Figure 3), and they had 30 minutes to apply the guided questions, then another 30 minutes to elaborate the storytelling and, finally, 10 minutes to graphically represent the solution for the proposed problem. After a 30-minute break, in order to prevent fatigue from interfering with the results of stage two, they were introduced to the guided questions with humour, including two short videos, both to reinforce the topic of the guided questions and to introduce the humour. The videos selected were the trailer of the film "Train to Busan" (Cinépolis, 2016) and a scene from the comedy "Zombies Party" (Ruiz, 2012). Subsequently, they repeated the same methodological steps as in stage one, but with the statement of problem B (Figure 4).

Figure 2. Development of the experience

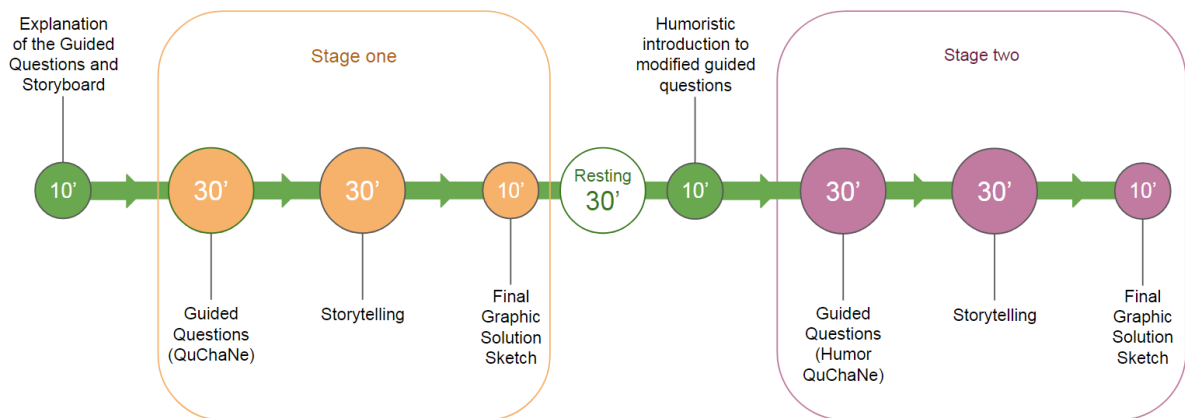


Figure 3. Problem statement A

**Problem A**

*The objective is to conceptualise an innovative element to help people with reduced mobility (elderly, physically disabled, etc.) to storage and compact their waste or fractions.*

- For 30 min. read the questions and briefly answer each question with one or more situations based on the example explained previously. Rate with a scale of 1 (low), 2 (medium) or 3 (high) the level of importance of solving the problem, the number of people affected, the economic level of not being able to solve it and the lack of solutions posed by the situation described for each of the answers. Select the answers with the highest values.*
- With the answers that have obtained the highest values, elaborate for 30 minutes the scenario of use of the product. To do this, you must define the characters, the user's expectations, how the product will be used, the context of use and the moment it will be used.*
- Using sketches and written explanations, show the final concept that best fits the situations described in the storyboard.*





Figure 4. Problem statement B

**Problem B**

*The objective is to conceptualise an innovative element to help zombies to transport and dispose their waste or fractions.*

- For 30 min. read the questions and briefly answer each question with one or more situations based on the example explained previously. Rate with a scale of 1 (low), 2 (medium) or 3 (high) the level of importance of solving the problem, the number of people affected, the economic level of not being able to solve it and the lack of solutions posed by the situation described for each of the answers. Select the answers with the highest values.*
- With the answers that have obtained the highest values, elaborate for 30 minutes the scenario of use of the product. To do this, you must define the characters, the user's expectations, how the product will be used, the context of use and the moment it will be used.*
- Using sketches and written explanations, show the final concept that best fits the situations described in the storyboard.*



## 2.5 Creativity evaluation

The creativity of proposed concepts was assessed using the metric proposed by López-Forniés et al. (2017), who propose to measure creativity as the combination of three parameters: novelty, usefulness and feasibility. These three aspects were evaluated in the concepts by following the criteria set out in Table 3. The creativity value was calculated for each



concept by multiplying the three values. So, the creativity score is ranged between 1 (more creative) and 0.001 (less creative).

**Table 3. Values and interpretation for novelty, usefulness and feasibility's assessment**

Value	Interpretation
1	Much novelty, usefulness or feasibility
0.7	Average novelty, usefulness or feasibility
0.3	Little novelty, usefulness or feasibility
0.1	No novelty, usefulness or feasibility

## 2.6 Statical analysis

The statistical analyses were performed with SPSS software, PASW Statistics version 23 (IBM Corporation). Variables were defined to analyse the parameters novelty, usefulness and feasibility based on the rater's appraisals of the solutions chosen by the participants. The total creativity of a concept is considered to be the product of the three previous parameters.

The ratter was a PhD in Engineering, with several years of experience in projects related to creativity and circularity. Two other raters, junior design engineers with academic but not professional experience in the field, were asked to evaluate the concepts. The coefficient of intraclass correlation has been calculated resulting  $r=0.928$ .

Shapiro-Wilks analysis was performed in order to test normality. Values of novelty ( $\text{sig}=.053$ ) and creativity ( $\text{sig}=.081$ ) present normal distribution, while usefulness ( $\text{sig}=.006$ ) and feasibility ( $\text{sig}=.04$ ) have not normal distribution. According to that, ANOVA test was used to determine if the use of humour has an effect on the novelty and creativity of the results, and Kruskal-Wallis assessment for usefulness and feasibility.

## 3. Results and discussion

Figure 5 present the concepts elaborated by the design groups for each problem. Table 4 shows the results of the evaluation of the concepts in terms of novelty, usefulness and feasibility, and the value of creativity, corresponding to the combination of the previous three.

**Table 4. Results of the novelty, usefulness and feasibility's assessment**

	QuChaNe						Humour QuChaNe					
	G1	G2	G3	G4	G5	G6	G1	G2	G3	G4	G5	G6
Novelty	0.3	0.3	0.3	0.7	0.3	0.3	0.7	0.7	0.1	1	0.7	1
Usefulness	1	0.7	0.7	0.7	0.7	1	0.7	1	0.3	1	0.7	1
Feasibility	1	0.7	0.7	0.3	0.7	0.7	0.7	0.7	1	0.1	0.3	0.1
Creativity	0.3	0.15	0.15	0.15	0.15	0.21	0.34	0.49	0.03	0.1	0.06	0.1

**Figure 5. Concepts generated during the experience**

	Problem A (QuChaNe)	Problem B (humour QuChaNe)
Group 1		
Group 2		
Group 3		
Group 4		
Group 5		
Group 6		

Regarding to novelty, the ANOVA analysis point so significant differences between the two problems  $F(1, 11) = 4.95, p=.05$ . In this case, it can be seen in Figure 6 a) that the solutions proposed with the humour integrated version are rated as more novel than the original ones. One reason for this may be that humour disinhibits and makes more novel ideas flow. In fact, Davis (1999) indicates in his research that the part of creativity that is enhanced by humour is that related to novelty, as he analyses the parameters originality, flexibility and fluency.

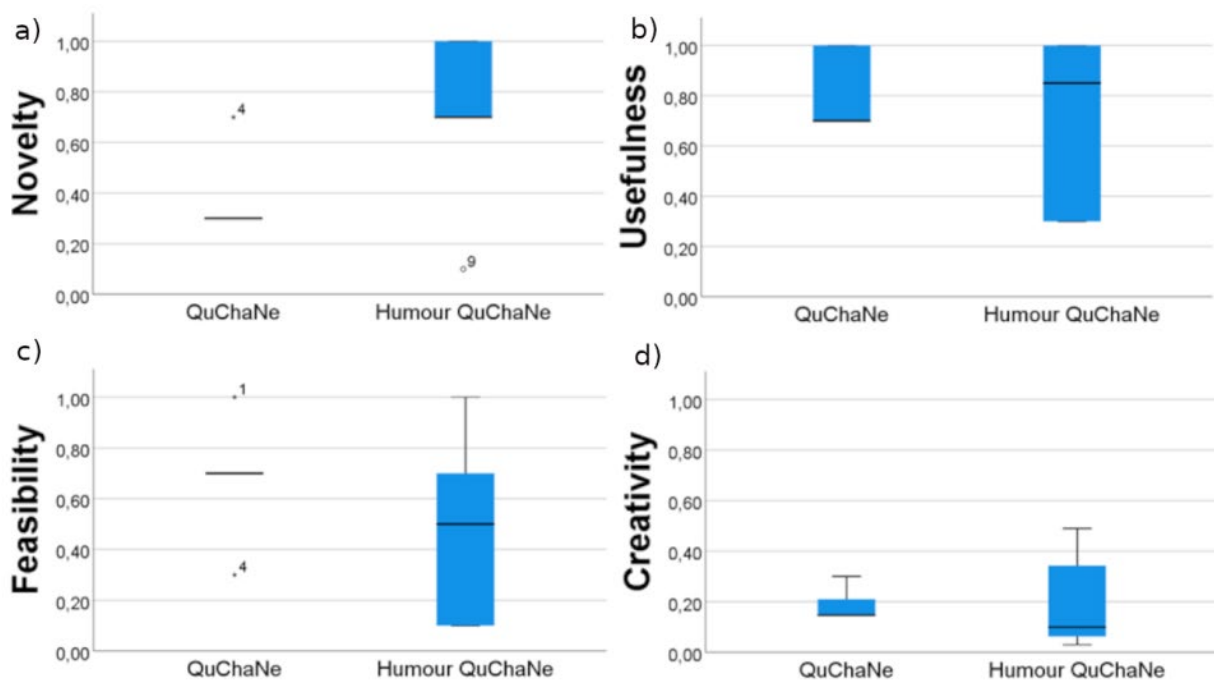
The difference in the usefulness of the proposals was found to be non-significant, according to the Kruskal-Wallis analysis  $H(1) = 0.03, p=.863$ . However, looking at the graphic in Figure 6

b), it can be seen that, although the medians present similar values, the distribution between the two groups differs considerably. While for the proposals developed with the QuChaNe the ratings are all within the range between 0.7 and 1, the solutions resulting from integrating humour are distributed in a range between 0.3 and 1. Therefore, there is a part of the population that seems to have been influenced by the inclusion of humour, losing the advantage of focusing on the desired function provided by the guided questions (Royo et al., 2021). Another reason that could cause the loss of usefulness is the humorous topic selected. As zombies are not “real users”, the main objective of the design could have been distorted (fantasy vs. reality) (Bunce & Woolley, 2021).

Feasibility analyses also point to no significant differences between the two methods  $H(1) = 1.065$ ,  $p=.302$ . Nonetheless, according to Figure 6 c), in this case a difference in the distribution of the results can be seen that is more noticeable than in the previous case. The results obtained with the application of the QuChaNe methodology show a score of 0.7 almost in their totality, whereas when integrating in humour the 75% of the results show lower scores. One hypothesis of why this would happen may be that the same disinhibition that causes a significant increase in the novelty of the results leads to a lesser focus on feasibility, since under normal conditions, during the selection of alternatives phase, design teams tend to select as the “final solution” the one that is more feasible instead of the most novel one (Paulus & Coskun, 2011). Therefore, by integrating humour, this tendency seems to be reversed, selecting the most novel instead of the most feasible.

Lastly, creativity, as the combination of the three previous factors, does not seem to present significant differences between the original method and the one that includes humour,  $F(1, 11) = 0.003$ ,  $p=.955$ . This result seems logical, since when analysing the parameters separately, it was seen that by integrating humour into the methodology, novelty increased, while usefulness and feasibility decreased, so when these parameters are combined, they compensate each other. Figure 6 d) only shows a greater dispersion in the results obtained by integrating humour, but the medians are very close in both cases.

**Figure 6. Box and Whisker plots of the assessments performed**



## 4. Conclusions

In this paper, we have seen a case study of the integration of humour in a creative design methodology. The methodological guidelines for the integration of humour have proved to be effective, at least in the particular case of the QuChaNe methodology, defending the hypothesis postulated at the beginning of the manuscript.

As for the parameters that compose the creativity of the products obtained, it has been found that the novelty of the results increases significantly, albeit slightly at the expense of their usefulness and feasibility. Although the decrease in these two parameters has not been found to be significant, they have been sufficiently notable to influence the total creativity values, so that creativity does not present significant differences between the two assumptions.

### 4.1 Future research lines and limitations of the work

Therefore, one of the alternatives to improve the experience would be to look for another topic that, being able to generate the humour state, in order to maintain the increase in novelty, could avoid the decrease in usefulness and feasibility. According to the discussion in this article, we could try to use a less fantasy-like topic. It would also be useful to analyse the effect of disinhibition on these parameters by other methods than humour, in order to check whether it is a generalised cause of disinhibition or a direct effect of humour.

Finally, it would also be interesting to replicate this same experiment in order to increase the sample, as the initial results have proved interesting. A study with a larger sample would give greater robustness to the conclusions and reinforce the need for further studies derived from this research.

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**Comunicación alineada con los Objetivos de Desarrollo Sostenible**

