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## **The Undesired Effects of Digital Communication on Moral Response**

**Efectos no deseados por la comunicación digital en la respuesta moral**

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### **Abstract**

The current paper is based on the hypothesis that communication through the new digital technologies modifies the moral response of users, and therefore reduces social capital. This approach has been contrasted by designing and conducting an experiment (N=196) using our own adaptation of the Spanish version of the Defining Issues Test on subjects who have been socialized by Internet and who constitute the representative samples of this study. This test on paper was adapted to our research following an expert validation procedure and then transferred onto two types of digital audiovisual formats. Finally, the use of digital communication technologies and students' fluid intelligence response were evaluated in order to establish whether their response was significant and if it modified moral response. The results confirm the hypothesis and show that the quality of moral response decreases when digital technologies are used instead of pencil and paper. This difference is greater when virtual images of people designed by animation are used rather than visual images of real people. In addition, the results show that fluid intelligence mitigates these modifications.

### **Resumen**

Se investiga cómo la comunicación mediada por tecnologías digitales modifica la respuesta moral de los usuarios, y por tanto, varía el capital social. Se diseña y realiza un experimento con 196 sujetos que se sirve de una adaptación de diseño propio del «Defining Issues Test» en papel, a partir de la versión española, sobre una muestra representativa del universo de sujetos que se han socializado con Internet. Se valida la adaptación del test sometiéndolo a juicio por un panel de expertos, se amplía el mismo a otros dos formatos digitales audiovisuales diferentes: con imágenes reales de personas o con imágenes virtuales de personas a través de animación, y se comprueba si la inteligencia fluida de los sujetos es significativa en la modificación de la respuesta moral. Los resultados confirman las hipótesis y demuestran que la calidad de la respuesta moral disminuye cuando se usan tecnologías digitales respecto a cuando se usa papel y lápiz. Esta dife-

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rencia es mayor cuando se usan imágenes virtuales de personas a través de animación que cuando se usan imágenes audiovisuales de personas reales. En todos los casos la inteligencia fluida es un atenuante de estas modificaciones.

### **Keywords / Palabras clave**

Digital communication, audiovisual communication, on-line morality, moral development, moral dilemmas, digital literacy, social capital, citizenship.

Comunicación digital, comunicación audiovisual, moralidad on-line, desarrollo moral, dilemas morales, alfabetización digital, capital social, ciudadanía.

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## **1. Introduction**

This research seeks to discover, measure and assess the undesired effects on moral response when digital technologies are used to communicate. This study does not examine the ethical implications of subjects' digital behaviour in terms of identity, authorship, participation, credibility, privacy and community membership (Rundle & Conley, 2007), rather the aim is to evaluate the influence that digital communication tools might have on moral response by their very nature and the way they are used. The study analyses the causal relationship between the alteration in moral response and the variable that consists of digital communication versus pencil and paper communication.

The vitality of the Internet, the emergence of the 2.0 and 3.0 networks and the massive, widespread use of digital information and communication technologies have armed all of us users with instruments that have vastly increased our capacity to communicate. This means that it is important to assess not only the evident advantages but also to be aware of the negative effects on moral cognitive capacities and the consequent decrease in social capital that subjects, and the social networks in which they are integrated, could suffer.

While there is more than one concept of social capital (Bourdieu, 1980; Putnam, Leonardi & Nonetti, 1993; Coleman, 2001) and no unanimously accepted restriction on the use of this notion (Annen, 2003; Portes, 2000; Durston, 2000), all authors emphasise the difference between social capital and physical and human capital, in that social capital is specific to individuals and, as such, participants in social networks.

It is also agreed that social capital can also have negative effects, by fomenting inter-group rivalries (Durston, 2000), restricting participants' freedom and hampering outsiders' access (Portes, 2000) or undermining individual motivation in communities (Heinze, Ferneley & Child, 2013).

The development of digital communication technologies has led to a proliferation of a wide variety of digital communities and a taxonomy of collaborators that is both open and highly unpredictable. Researchers have observed how digital technology has helped increase the social capital within these communities at very little cost (Shim & Eom, 2009) and how the benefits influence participants' commitment to a digital community (Heinze, Ferneley & Child, 2013). We propose the revival of what was initially meant by social capital in the analysis and expectations of success in educational institutions (Coleman, 2001; Ramírez Plascencia & Hernández González, 2012) in order to study the negative impact of activities

mediated by digital technologies on the modification of the links between students, and between students and the institution, as actors within these communities that, by their nature, contain predictability, trust, regulation and coherence.

This is particularly significant when we consider the social skills acquired by those subjects already socialized and intellectually mature, surrounded by the ever-present network of networks.

Normally the voices raised in alarm against this digital imperialism are dismissed as apocalyptic, retrograde or reactionary. Nevertheless, there are authors who have developed a deep knowledge of, and who were present at, the founding of digital communication systems (Lanier, 2011); who have charted their emergence as writers in the specialist press (Carr, 2011); who have studied how these technologies have been incorporated in education (Buckingham, 2008; Gardner, 2005; Palfrey & Gasser, 2008); or who simply use their press platforms as observatories (Frommer, 2011) and advise us to exercise caution.

Probably the most complete set of warnings came in the qualified responses posted in 2010 on «edge.org» in response to the question posed that year: «How is the Internet Changing the Way You Think?» (Brockman, 2011). The alert was based on knowledge, reflection and caution and urged that it was important to understand to what extent the advantages of incorporating digital communication technologies could also contain within them certain, as yet unseen, disadvantages.

This admonition is well argued by Prensky (2012) or in international programmatic documents (UNESCO, 2005; Rundle & Conley 2007). Being aware of the hybrid nature of all human actions, perhaps there is no other external object quite like these digital tools, hardware and software, capable of usurping more capacity as moral agent in collaboration with «humanware». Neither should we underestimate the neurological changes that digital communication activities can cause (Wolf, 2008; Small & Vorgan, 2008; Watson, 2011).

These warnings are by no means redundant; they do not take up the cause against the mass communication media initiated by influential XX century authors (McLuhan, 1993; 2009), warning of the coming of the society of the spectacle (Debord, 1999 a; 1999 b), or the transformation that the subject undergoes (Sartori, 1998). Today, these authors do not perceive a dystopian future like the one that some sociologists wished to avoid (Beck, 1998; Jonas, 1995). They are aware of these criticisms (and in some cases they use them as a starting point) but they remain cautious in their pronouncements and assume that digital communication technologies are here to stay.

This research uses an unusual perspective in its analytical framework. It is not enough to examine the linguistic, technological, interactive, ideological or aesthetic dimensions of the production and reproduction of digital messages (Ferrés & Pisticelli, 2012). Without neglecting concern about why institutional policies agree on common objectives or why schools and families echo the need to digitally educate our youngsters (Aguaded, 2011), we would have to consider, before we contemplate digital equality (Gozálvez, 2011), the possible changes that occur in the moral cognition of digital environments. And this is pressing, as the role of the new communication media in civic education and political activity becomes great-

er, and it is no longer appropriate to see the media from the learning-service perspective (Middaugh & Kahne, 2013).

The general aim of this research is to determine if the moral response among young people socialized in the omnipresent digital media remains intact or undergoes changes as the sole result of using communication media. The specific objectives are: first, constructing a definition of morality that is procedural, and establishing a diagnostic procedure that enables us to measure any possible modification in moral response as a consequence of communication mediated by digital technologies; second, to design and carry out an experiment on a significant sample of young people socialized in the digital world and who have no academic specialization or particular attributes in the use of these digital technologies.

A diagnostic tool was designed with the aim of confirming or refuting the following hypotheses: first, moral response changes with the use of digital communication media; second, this possible alteration is influenced by exposure to virtual images of people in animated form as opposed to images of real people; third, the subject's fluid intelligence is relevant in terms of the possible effect on moral response provoked by digital communication.

## **2. Material and methods**

This causal, experimental investigation follows a procedure that is empirical, transversal and prospective, and it is measured quantitatively. First, we take Kohlberg's (1992) idea of morality as a starting point; second, we design a diagnostic tool to carry out an experiment on a substantial sample; third, we provide quantitative results that are statistically analysed on which to base conclusions.

### **2.1. Morality: reflection and universalizability**

The capacity of a judgement to raise itself to a universal category (that is, its universalizability) and the habit of judgement, guarantees a moral response that can be considered worthy of transmission to others; it renders the individual less capable of a desire for wrongdoing and prevents him from making an exception of himself. All attempts to base universal ethics on material instincts have failed, and so far there has been no opportunity for a set of ethics to emerge that has its root in what occurs in our brains (Cortina, 2011). Nor Neither can we deduce any universal ethics from in phylogenetic or ethnographic research since this would presume falling into the trap of the naturalist fallacy that attributes pseudo-sacred character to something that exists.

If we have known since Aristotle that it is in the habit of judgement that the capacity to distinguish right from wrong resides, it was Nietzsche who showed us that good and evil also have their own genealogy. To make our experiment efficient across beyond social, cultural and professional differences, and also to apply it to various contexts, we use procedural ethics based on Kantian tenets that do not aim to frame rules or codes but capture the universal condition of the rules. We subscribe that the rule will have to emerge from sociability, publicity, impartiality, altruism and coherence (Arendt, 1995; 2003).



## 2.2. The diagnostic method

Our concept of moral judgement as a consequence of the habit that pursues universality is consistent with theorists of moral development such as Piaget (1974) and Kohlberg (1992). Kohlberg expertly developed Piaget's epistemological procedures by extending to morality the procedure that Piaget applied to the categories of space, time and cause, etc. Hence, cognitive development is not necessarily paired with moral development, it merely enables it. So the very habit from which moral judgement proceeds has to be exercised, with the supposition that the superior cognitive development that fosters it is already given (Kohlberg, 1992; Hersh, Reimer & Paolitto, 2002).

Kohlberg's diagnostic approach adapts a method from clinical practice in order to understand the moral state in which a subject finds himself. To do so, the interviewee is given some moral dilemmas which are relevant to the subject, and the method follows the reflections that the subject uses to justify his position with regard to the dilemma. After repeating this semi-structured interview over several years with the same group of young people, Kohlberg and his collaborators were able to state that moral development in all individuals can be categorized in the six hierarchical moral states they discovered.

Each moral state involves qualitative differences in the way of thinking, and coalesces with other states within a fixed hierarchical sequence; the six states range from the pre-conventional state (egocentric, the result of a moral heteronomy guided by avoiding punishment and winning the prize) to the post-conventional level that pursues validation of universal principles and commitment to others.

The main criticisms of Kohlberg's thesis centre on the rigidity of the system of states that the subject must fit into and the likely instability of the procedure, given the importance that it would have in any analyst's interpretation. Although Kohlberg convincingly countered these criticisms, we refer to the revision of some of his ideas by his followers which came to be known as neo-Kohlbergianism (Rest, Narvaez, Bebeau & Thoma, 1999; Rest, Narváez, Thoma & Bebeau, 2000), and the Defining Issues Test (D.I.T.) produced by James Rest (1979; 1986).

Rest and his team improved the theory and procedure, and provided an objective tool to measure morality in subjects. They emphasise moral schemas rather than moral states, although in essence the hierarchical organization is the same. This enables us to test the individual who, after being presented with a moral dilemma, must evaluate incomplete lines of reasoning in various behavioural options proposed in relation to this dilemma, and which the subject evaluates from his own moral schema. The analyst does not intervene other than to check the correctness of the procedure or interpret, but tabulates and establishes a diagnostic based on the computed data.

The D.I.T. contains six dilemmas each requiring three reflective moments in sequence. On the first reflective level, the subject has to propose a general solution to the dilemma. On the second, the subject must evaluate in order of importance 12 items related to the dilemma. In the third instance, the subject selects four questions from the 12 in order of importance, to then decide on the protagonist's behaviour in relation to the dilemma.

**DILEMMA 6.**

Title: The High School newspaper

*Alfredo: a student in the fourth year of secondary education at the “Velázquez” High School wants to publish a newspaper so that all students can express their opinions, photocopying articles to be written for the school’s website. He wants to write about politics, sports, young people and their world and the environment, but most of all, he wants to criticise some of the school rules, such as one which bans students from attending class wearing any form of headwear like caps or hats. After he formulated the idea, he went to see the **Principal** to ask permission. The **Principal** agreed, on condition that **Alfredo** submit all articles for his approval before publication. **Alfredo** agreed and showed the **Principal** the articles which he duly approved, and Alfredo published two monthly editions of the newspaper. The **Principal** did not expect the newspaper to be so successful among the students. The students were so impressed by its content that they have started to organize protests against the rule on headgear in class and other measures. The students’ parents objected and urged the **Principal** to stop publication. As a result of the tumult caused by **Alfredo**’s articles, the **Principal** ordered **Alfredo** to stop publishing the newspaper, citing the fact that the newspaper was disrupting the school routine.*

Should the Principal ban the publication of the newspaper?

(mark one of the three options with an “X”)

Yes, he should	<input type="checkbox"/>	I can’t decide	<input type="checkbox"/>	No, he shouldn’t	<input type="checkbox"/>
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Read the following statements and select **by marking with an “X” (very important, important, quite important, not very important, not at all important)** according to the importance you give each one

Nº	QUESTIONS	Very important	Important	Quite important	Not very important	Not important at all
1	You must take into account whether the Principal is more accountable to the students or to the parents.					
2	You would have to decide if the Principal authorized publication of the newspaper for a long period of time or only promised to approve it each time it was ready for publication.					
3	The students would protest even more if the Principal stopped publication.					
4	The Principal could have the right to give orders, like these, to the students when the proper functioning of the school was under threat.					
5	The Principal is free to say “No” in this case.					
6	The banning of the newspaper enabled the Principal to avoid any indepth discussion of important problems.					
7	The order could have made Alfredo lose confidence in the Principal.					
8	It would be important to know if Alfredo really is loyal to his school and a good citizen for his country.					
9	It would be necessary to consider what effects the ban on the newspaper would have on the education of the students’ critical thinking and on their values.					
10	It would be necessary to think about whether Alfredo was violating the rights of others by publishing his own opinions.					
11	The Principal should not let himself be influenced by angry parents when it is he who best knows what is happening.					
12	Perhaps Alfredo is using the newspaper to create discontent and rancour.					

Now write the number of four of the statements from the list above that you consider the most important

The most important	<input type="checkbox"/>	The 2nd most important	<input type="checkbox"/>	The 3rd most important	<input type="checkbox"/>	The 4th most important	<input type="checkbox"/>
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**Figure 1. Example of this study’s version of the dilemma and questionnaire updated and adapted from the D.I.T. (The videos of this dilemma in their real and virtual audiovisual versions are available on <http://goo.gl/xtKtL3> and <http://goo.gl/Vy7of8>).**

After tabulating all these results, we obtain a dominant moral schema for the subject’s thinking. And the test’s reliability is backed by numerous studies across

different countries, cultures and contexts (Luna & Laca, 2010). The procedure of our experimental design is:

- a) Following the recommendations of a panel of experts consisting of eight secondary school teachers of various subjects (Philosophy, English language and translation, and Technology, among others) the wording of the Spanish version of the D.I.T. by Pérez-Delgado (1996) was updated and the translation of several phrases changed to minimize the errors which arose in some items that were expressed as questions but were rewritten in the affirmative form. To improve the test's usability it was decided that all the questions would be answered on the same sheet that contained the dilemma and not on a separate piece of paper (figure 1).
- b) From our D.I.T. version, the six dilemmas were transferred onto two other formats that differed from the version on paper: the format that we call real audiovisual is a spoken audiovisual of the dilemma read out in the style of a news broadcast, with a neutral background and a single image of the speaker in a middle ground shot; there is no musical accompaniment or shot changes or camera movements; and the format we name virtual audiovisual is formed of a presenter in human animation form speaking in a news reporting style made with «iClone v2. Real Time 3D Filmmaking» animation software (Reallusion, 2007); there is music, shot variation and camera movements. We also posted the respective questionnaires of each dilemma on-line with the use of the «Google-Drive» app.
- c) We set up «blogs» on «Google's» «Blogger» platform with the videos and questionnaires distributed in different combinations for each of the sample groups. As a result, each group views two of the six dilemmas in the real audiovisual format and completes their corresponding «online» questionnaires, two dilemmas in the virtual audiovisual format with their «online» questionnaires and two dilemmas in pencil and paper format.

### 2.3. The sample

The population universe consists of subjects born after the emergence of digital technologies in Spain who are accustomed to taking classes in which both printed material and digital technologies are used, who are nondigital technology experts in terms of usage and training, and are old enough to display all the states of moral development. The universe is limited to young people of both sexes, over 14 but under 18, in pre-university education and who are not taking professional courses linked to digital technologies.

The sample was taken from a secondary school in the town of Fuenlabrada, near Madrid, with 233 students that matched these requirements and which, in terms of yearly pass rates, graduation and university places gained, is similar in academic achievement to any other educational centre in the Autonomous Community of Madrid.

These students were given the Raven (2001) progressive matrices test measured on the Standard scale for fluid intelligence (the capacity to think and reason abstractly) which yielded a mean of 49.46 and a standard deviation of 5.842 (the measures proposed for these ages in Spain have a mean score of 47.89 with a standard deviation of 6.19), so the sample was deemed to be adequate.

For the experiment to run smoothly and to enable subsequent comparisons, it was decided to divide the subjects into eight randomly selected groups, from classes in the three years prior to university entrance.

The sample initially consisted of 196 students who performed the experiment in the computer rooms at the school. A total of 184 students completed the test, and after eliminating unavoidable registration errors, 160 were found to have answered the questions on all the dilemmas, with an equal spread among the groups and by gender. Having no data on similar experiences to work on, and given the complexity of the procedure, we consider the figure of 81.6% of participants to be a success, similar to what was expected and acceptable.

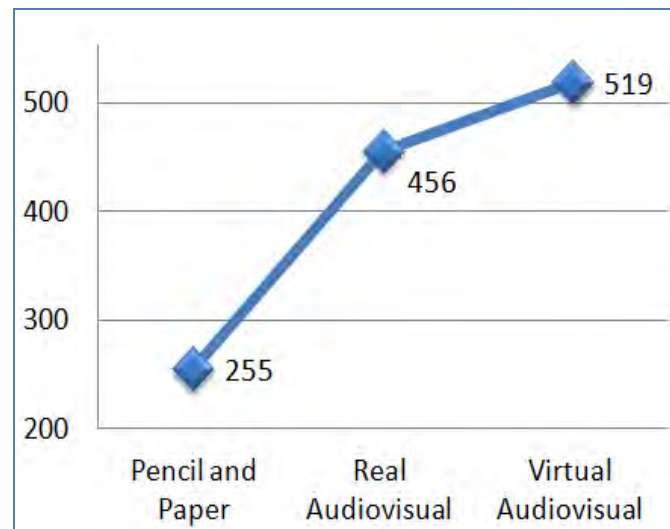
### **3. Analysis and results**

The results were significant in terms of scales of incoherence, according to the support they used to resolve the moral dilemmas. Incoherence is defined (Rest, 1996) as a lack of congruence between the levels of reflection that the subject is faced with. The subject shows incoherence when, at the end of the questionnaire for each dilemma, he or she selects in order of importance the four questions (from the 12) that enable them to define the conduct of the protagonist of the dilemma and which are not among the questions given greater importance on the previous level.

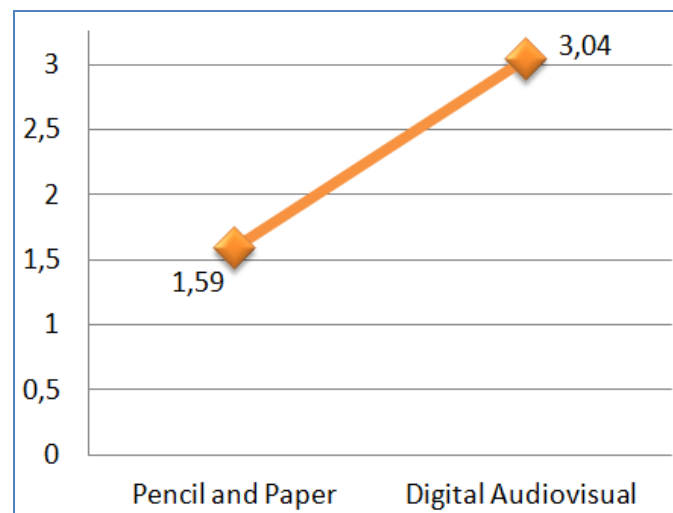
Rest and collaborators (1986) proposed eliminating questionnaires with one dilemma that contains more than eight incoherencies, or which revealed incoherencies in two or more dilemmas. The different quantitative levels of incoherence are established in the following way: when the item chosen as the most important does not correspond to any of the items selected from among the 12 as being most significant in the previous stage of reflection, it is computed as 1 point of incoherence. If the second of the four options in importance selected does not have any other item (except the first) considered more important, it does not count as incoherent but if it had one, it would be deemed to be another point of incoherence. If the same happens with the third, another point; and if the fourth also has another option ahead of it (besides the items chosen in first, second and third place) another point is added. So each questionnaire for each dilemma can score a maximum of four points in incoherence when none of the four options chosen and graded in terms of importance is congruent with the evaluation made immediately above on each of these options. The maximum incoherency would be 24 and the minimum 0.

The statistics show a mean of 7.72 incoherencies per individual and a standard deviation of 4.63. The spread of incoherencies per dilemma and individual varies slightly from 1.04 to 1.44, so the different content in the dilemma can be discarded as an influence on the subjects' incoherencies. Likewise, the number of incoherencies has no significant variances in terms of belonging to a particular group or gender. By contrast, the spread of incoherencies is highly significant with regard to the communication medium used to transmit the dilemma and to the completion of the questionnaire (figures 2, 3 and 4).





**Figure 2. Total incoherencies among the 160 participants.**

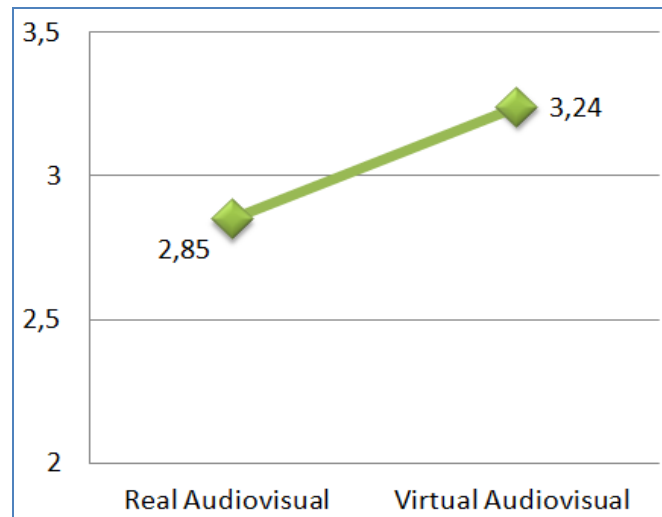


**Figure 3. Incoherencies by dilemma and subject.**

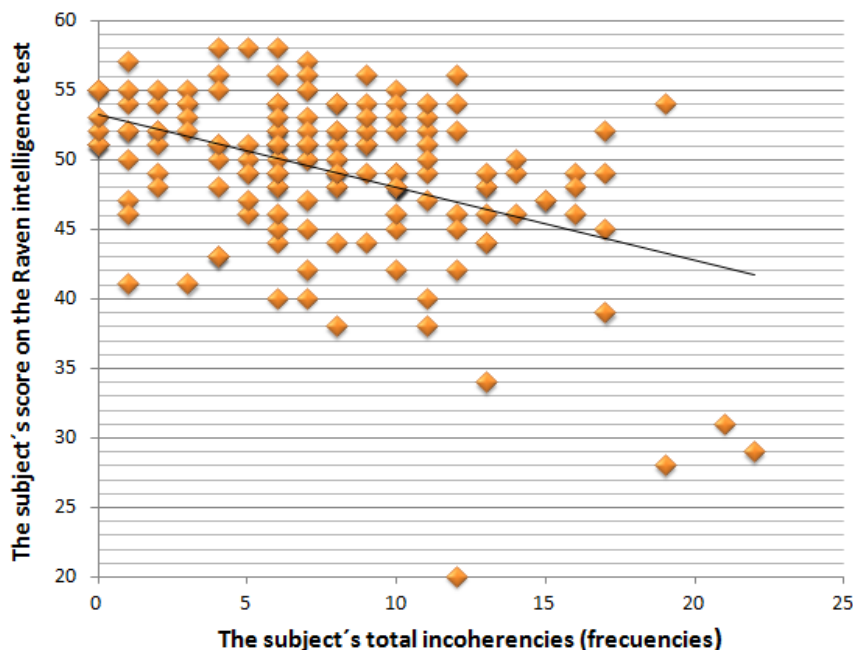
For each incoherence that appeared in the pencil and paper format there were 1.8 incoherencies in the real audiovisual «online» format and 2.0 incoherencies in the virtual audiovisual «online» format (figure 2). Compared overall, for each dilemma and subject we find that incoherencies multiply by 2 when we use «online» audiovisual digital communication to apply the test (figure 3).

The ANOVA ( $\alpha=0.05$ ) test to contrast the dependent viability (virtual audiovisual/real audiovisual/pencil and paper) produces this result:  $F=10.42 >$  critical value  $F_c=3.47$  and ANOVA ( $\alpha=0.05$ ) which corroborates that the student distribution in their groups that has had no influence, and generates  $F=1.19 <$  critical value  $F_c=2.66$ ; the correlations between the different groups of the sample have the same positive values from, 0.57 to 0.99, and with the mean value of 0.89; and the analysis of the correlations of the incoherencies according the communication medium used varies from 0.44 to 0.65.

What is also significant is the difference between the appearance of incoherencies when a real person (real audiovisual) is used to present the dilemma in the audiovisual format or when the speaker appears as a news presenter designed by animation software (virtual audiovisual), with even more incoherence when in virtual audiovisual format (figure 4).



**Figure 4. Incoherencies by dilemma and subject.**



**Figure 5. Dispersion of the incoherencies displayed and the Raven intelligence score for each subject.**

It was found that the fluid intelligence in each subject, as measured by the Raven test, manifests a negative and moderate correlation with respect to the total appearance of incoherencies, with a Pearson  $r$  value of 0.42 (figure 5).

#### **4. Discussion and conclusions**

The moral response of our subjects is modified when communication is mediated by digital communication technologies. The moral response of individuals is of inferior less quality (less reflective and with a lower capacity to rise to the universal category) when we use digital communication technologies (to transmit content and extract responses) than when we use the traditional procedure of pencil and paper.

Since all moral response requires coherence to be considered as such, when incoherent it will be less moral given that we have conceived morality as constituted by reflection and universalizability. Reflection demands maintenance of judgement over time, and universalizability is relevant since it does not make judgement dependent on the person who judges or who executes the action. Coherence in each judgement does not determine the moral tenor but it does determine its moral condition.

The audiovisual content in which animated images appear representing virtual people extracts a moral response that is even more incoherent (less reflective, less capable of universalizability) than when the audiovisual content shows real people presenting moral conflicts. The individuals' fluid intelligence in our sample is a mitigating circumstance of this modification of the moral response in terms of the communication medium used.

Therefore, the formats and digital media tend to devalue the moral response of our subjects, and the use of virtual images of people instead of real people has an even more negative influence on the quality of the moral response. It was found that a subject's sense of commitment when clicking on the mouse is much less than when ticking a box with pencil on paper. The click of the mouse is easier, the body uses less intensity to carry out the action, the mind decides on something with less sense of responsibility.

Remember that our sample is composed entirely of young people with no academic specialization, and who were born in an era when Internet was starting to form part of our everyday lives; young people who hardly read content that is nondigital. Yet they show greater respect for the written word on paper than the digital version.

These results cannot be contrasted with previous research that used D.I.T. since those tests were applied to experiments on paper, «online» but not audiovisual (Xu, Iran-Nejad & Thoma, 2007; Jacobs, 2009; Clark, 2010; Palacios-Navarro, 2003). Our procedure is in line with other investigations whose starting point is communication mediated by digital technologies and which examine the social capital of individuals and their digital communities (Heinze, Ferneley & Child, 2013; Shim & Eom, 2009).

The results of our research take on meaning in this field of investigation in which new digital tools become instruments for citizen learning and empowerment (Gozálvez, 2011; Ferrés & Pisticelli, 2012; Middaugh & Kahne, 2013; Buckingham & Rodríguez, 2013), since our findings point to a negative effect on social capital that hitherto had gone unobserved.

It is common to see in early research into social capital (Bourdieu, 1980; Coleman, 2001; Putnam, Leonardi & Nonetti, 1993) that intergroup confidence is an important factor for analysis, that the rules and the acceptance of these rules

are crucial and that the benefits that bind the community together are forged by reciprocal expectations. Our research adds factors that could diminish social capital (Durston, 2000; Portes, 2000; Heinze, Ferneley & Child, 2013), that the digital technologies of communication reduce the coherence of the moral response. That is, they limit the commitment that the social actor establishes with rules and the expectation of complying with them.

Future research based on these conclusions might want to improve the diagnostic tool we have used (incorporating more variables such as the possible audiovisual «framing» effect (Sádaba, 2001), and make it more versatile, reliable, refining it for use with other populations; they could also broaden the universal population (transversally and longitudinally), situations (other settings: metaverses, avatars...; other digital devices: tablets, cell phones...; other contexts: testing individually, with confidence groups...).

Many believe that there can never be a definitive truth in ethics, but that is not entirely true since coherence is the «*conditio sine qua non*» of ethics. Unstable moral conduct, or incoherent morality, is not moral, which is not to say that it is immoral. The distance between what is good about a quality and how far one is from possessing that quality is not the same. Besides, moral competence underlies the action, and if it not so, the action becomes unstable, changeable, capricious, prone to manipulation and unconscious.

In another way, an accommodating morality is a moral response. As long as the setting does not change, the moral decision remains constant with what has been decided beforehand. But this research concludes that digital media also dilute any possible accommodation of thought in the context.

The discussion of the results of this research suggests we need to reflect on decisions for education in terms of digital communication media, as others have done (García-Canclini, 2007; Gozávez, 2011; Ferrés & Pisticelli, 2012; Middaugh & Kahne, 2013), and that education needs to recover for the screens and clicks (with the fingertip or the mouse) that commitment which students still show when faced with the written word on paper, the understanding they cultivate from the written word as opposed to the audiovisual, the consistency in thought that is revealed when using pencil and paper. If we do not exercise caution, a mass invasion of decision-making by digital communication media could cause technological incoherency in all those human aspects susceptible to change when using digital forms of communication (human relations, consumption, «online» democracy, distance learning, etc.)

There are no blind dynamics at work in human intention, nor is there in the technologies that surround us. Knowing that the compass needle faces north enables us decide our route, not towards the horizon indicated by the needle but towards the destiny we choose. Without discarding any of the advantages of digital communication technologies, just as we have done with the compass needle, it is we ourselves who decide what to leave behind and what to place before us.

Thus, the field of applications that emerges from the interpretation and discussion of the results of this experiment needs to be considered from a double perspective: better knowledge of the undesired effects that communication mediated by digital technologies can cause, and the configuring of systems for consultation, relating and participation for users in which those possible undesired effects are



foreseen, considered, minimized or nullified. If the digital technologies are here to stay it is because they contribute definite advantages to our everyday lives. But even our comfortable home sofa has to be used in moderation because it can seriously affect our health.

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