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The Disconnect between Gaming Research and Development

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Abstract: Video games clearly have great educational potential, both for formal and informal learning, and this avenue is being thoroughly investigated in the psychology and education literature. However, there appears to be a disconnect between social science academic research and the game development sector, in that research and development practices rarely inform each other. This paper presents a two-part analysis of this communicative disconnect based on investigations carried out within the H2020 Gaming Horizons project. The first part regards a literature review that identified the main topics of focus in the social sciences literature on games, as well as the chief recommendations authors express. The second part examines 73 interviews with 30 developers, 14 researchers, 13 players, 12 educators, and 4 policy makers, investigating how they perceived games and gaming. The study highlights several factors contributing to the disconnect: different priorities and dissemination practices; the lag between innovation in the games market and research advancements; low accessibility of academic research; and disproportionate academic focus on serious games compared to entertainment games. The authors suggest closer contact between researchers and developers might be sought by diversifying academic dissemination channels, promoting conferences involving both groups, and developing research partnerships with entertainment game companies.

1 INTRODUCTION

Video gaming is a popular recreational activity that millions of people worldwide engage in enthusiastically (Przybylski, Rigby and Ryan, 2010). This enjoyment factor can be purposefully harnessed to enhance formal education or to train specific skills (Randel et al., 1992). Indeed, there has long been interest in the relationship between games and learning, giving rise to two main social sciences research lines.

The first considers the use of games in formal educational contexts. In this case, video games are intentionally used as a tool to enhance the learning experience by motivating and engaging learners (Dickey, 2005) and by facilitating learning through suitable game mechanics (e.g., by providing immediate feedback, hints, and adaptive difficulty for exercises; Orvis, Horn and Belanich, 2008). This

perspective considers both serious games, i.e. games specifically created for the attainment of specific outcomes like learning, and commercial off-the-shelf games originally developed for entertainment but adopted for the purposes of some kind of educational activity.

The second research line considers learning in informal or non formal contexts, i.e. when gaming is largely recreational. In this case, learning is either self-directed or unintentional, and it strictly intertwines with entertainment. Studies considering this kind of learning stem mostly from the psychological literature, and consider the cognitive and perceptual benefits of frequent video gaming (see Powers et al., 2013, for a meta-analysis). Due to the kind of context considered, these studies overwhelmingly focus on entertainment games.

While these lines are distinct in many respects, they do share a number of common aspects. Firstly,

they both seek to determine the beneficial outcomes of gaming. At the same time, they sometimes consider broad typologies of games, without differentiating much between game genres (e.g., Boot et al., 2011). Similarly, they rarely consider individual differences in game preferences or learning styles (Gros, 2007; Papastergiou, 2009) and give relatively low priority to investigating the gaming experience from the viewpoint of the individual player (see Wouters et al., 2013, for a critique). Finally, as will be argued in this paper, they both seem to suffer a degree of isolation from game development practitioners and their activity (Ondrejka, 2006).

This last issue is especially troubling, since it carries the risk of making social sciences academic research self-referential, limiting the impact of scientific findings on stakeholders other than researchers, and confining the dissemination of results to the academic community. At the same time, a lack of communication between game developers and researchers can lead to academic research that is misinformed about the world of commercial video games, and especially about the constraints and opportunities in for-profit game development practice (Blow, 2004; Wender & Watson, 2012). The very different paces at which the game industry and game research evolve exacerbate this factor (Kultima, 2015).

This paper reports the findings on this research-development disconnect that emerged from data collected in the H2020 Gaming Horizons project¹. Gaming Horizons has investigated the effects of gaming in society in a broad sense and from a variety of perspectives (psychological, educational, ethical, sociocultural/artistic), with the eventual aim of proposing alternative framings for considering the role of video gaming in society. In the course of the project, which has actively involved a range of stakeholders (researchers, developers, policy makers, educators, and players), the disconnect between social sciences academic research and the game development world emerged as a clear and important issue to be addressed. In this paper, we will closely examine the findings from two phases of the project (literature review and interviews with stakeholders) with the dual aim of identifying the main contributing factors to the disconnect and producing recommendations for bridging it.

¹ www.gaminghorizons.eu

2 METHOD

Gaming Horizons started at the end of 2016 and is due to end at the beginning of 2019. The project entailed a number of tasks, extensively described in the project deliverables (Persico et al., 2017a; Persico et al., 2017b) and had a much wider focus than the one considered in the present paper. Here, we will focus on the two tasks of the project most relevant for exploring and addressing the research-development disconnect: the literature review and the interviews with stakeholders.

2.1 Literature Review

The literature review (Persico et al, 2017a) had three closely interconnected goals: (i) identifying the main topics addressed within social sciences research into video games and gamification; (ii) highlighting the most influential contributions and results in order to obtain a broad overview of the 'state of the art' in this research field; (iii) collecting the recommendations made in those investigations, noting what is being recommended and to whom.

The review considered all the academic journal papers dedicated to games and gamification published since 2010 that were indexed on Scopus and Web of Science at the beginning of 2017. These were retrieved using sets of keywords specifically targeting three social science oriented perspectives, which we labelled 'psychological', 'educational', and 'ethical'; therefore, articles pertaining to the technological aspects of game development were excluded (for more details on the adopted methodology, see Persico et al, 2017a).

The full set of 9,157 retrieved papers was used to inform goal (i) through analysis of frequency and co-occurrence of paper keywords. Goals (ii) and (iii) were achieved by considering a selected subset of papers, since the large number of contributions made complete examination unfeasible. We selected the most 'influential' papers by using year-adjusted citation rates as a proxy for impact. Only papers one deviation standard or more above the mean citation rate of their publication year (for the full set of papers) were then taken into consideration (n=674). Subsequent manual selection of relevant papers through abstract reading led to the selection of 47 literature reviews and meta-analyses, which comprised the final set of papers for full reading. This set was used to meet goals (ii) and (iii).

2.2 Interviews with Relevant Stakeholders

A second phase of the project involved a total of 73 one-on-one interviews with stakeholders concerned with the role of video games in society and their potential for practical applications (Persico et al, 2017b). The stakeholders considered included 30 game developers (20 of whom were interviewed at two non-academic conferences: the Game Developers' Conference (GDC)² in the USA and Game Happens³ 2017 in Italy), 14 social sciences academic researchers, 13 players, 12 educators with experience in using games / gamification in class, and 4 policy makers involved with games.

The unstructured interviews, which were transcribed and analysed using a purposely-designed codebook, considered a wide range of topics, from the ethics of video game mechanics and contents to the potential of video games for learning. Both developers and researchers were explicitly asked about how they saw the relationship between video games research and development. Additionally, game developers were asked whether they were personally informed about academic social science research and, if so, whether it influenced their development practice. Educators, players and policy makers were not directly asked about the topic, and any mention of the issue on their part was unsolicited.

3 RESULTS

3.1 Literature Review

Outcomes regarding goal (i) of the literature review were fairly clear for the psychological and ethical perspectives but less so for the educational perspective. For psychology, six clear subfields of active investigation emerged: immersion / presence, motivation / flow, video game addiction, cognitive benefits of gaming (especially for older adults), health impact of games (e.g., exergames), and links between violent video games and aggression. Identified areas in the 'ethical' perspective were violence and aggression, identity and inclusion (e.g., regarding gender, race, special needs), and game monetization / manipulation. By contrast, keywords in the educational perspective did not neatly cluster around prevailing themes.

² <http://www.gdconf.com/>

³ <http://2017.gamehappens.com/>

Results of goal (ii) fall outside the scope of the present paper, which is focused on the disconnect between social science research and game development. However, it is worth noting here that even extensively investigated research questions, such as whether violent video games cause aggressive behaviour, generated inconclusive answers, sometimes with meta-analyses reporting conflicting results (e.g. Ferguson, 2015, and Greitemeyer and Mügge, 2014).

Regarding goal (iii) of the literature review, the most striking result is the sheer amount of recommendations directed from academic researchers to other academic researchers. Of the 81 recommendations gleaned from the analysis of full papers, 38 (46%) were directed to researchers, while only 11 (12%) were addressed to developers. This result is most evident for the psychological perspective, in which recommendations directed to other stakeholders are virtually absent, and most recommendations focus on future lines of research. This may in part stem from the fact that the 'future research' section is often a requirement for papers published in psychology journals (see, e.g., Sampson, 2012) and even where this is not the case authors tend to qualify inconclusive results with the caveat "more research is needed".

The set of papers in the educational perspective did yield recommendations directed to developers and educators. These mostly regarded developing more effective games for education (e.g. Merchant et al., 2014) and using existing ones more effectively, for example by making sure they align with learning goals and that they are calibrated on students' needs (Abdul Jabbar and Felicia, 2015; Tseklevs et al., 2016). Additionally, Tseklevs et al. (2016) address recommendations to policy makers for the adoption of serious games in education.

Lastly, addressees for recommendations from the ethical perspective vary by topic: recommendations on violence and aggression are addressed to both researchers and policy makers (e.g., Ferguson, 2015); recommendations on inclusion are addressed to both researchers and developers (e.g., Ratan et al., 2015); recommendations on monetization and exploitation are directed to researchers and developers (e.g., Heimo et al., 2016).

3.2 Interviews

As might be expected, most of the comments that interviewees made regarding the research-development relationship came from developers and researchers themselves. Developers interviewed in

the course of the project almost unanimously reported feeling very distant from academic research, and expressed considerable difficulty in locating and accessing findings (e.g., “I must admit I don’t read academic papers on games. To be honest, I’m not sure where I’d go to find them if I did”). When these developers did manage to source research output, their unfamiliarity with social sciences jargon made the contents difficult to grasp (“A lot of academic language is also very, how should I say this, specific. Almost to the point of inaccessibility”). Those few developers who did report having knowledge of social sciences academic research were actually directly involved with academia, either as researchers themselves or as teacher/students of game design (“I ended up mostly focusing on design but from a somewhat academic angle”).

Furthermore, academic research was sometimes written off because it didn’t focus on aspects relevant to the commercialization of video games (“I needed the research to prove people would buy this, people would support it, we would see an increase in sales, [...] but there wasn’t any research that I could find for games that showed this”; “The studies that are most useful to game developers from academia seem to rarely be actually directly related to games; they seem to be more related to human psychology and general human computer interaction”). However, one interviewee reported that this view may be biased by unfamiliarity (“Maybe I might start to get more into it, if I find something that appeals to the kind of thing I like to read about”). Aside from market concerns, when interviewees made explicit the kind of research they would be interested in, they reported wanting more research from a narrative / artistic perspective (“I would love to bring the humanities into what we’re doing more”; “Narrative games and psychologically challenging games would be the next step”). They also expressed interest in user psychology (“[Developers have] questions about psychology, there are questions about human physiology and how we respond to visual cues, things like that”; “obviously psychology is one big area that is useful and can be applied to games; if that research is focused on the psychology within games, entertainment games, that could really enhance that”).

In general, the interviewed developers did report being interested in research and innovation and being kept up to date by reading non-academic websites (“I try to stay up to date with research. I couldn’t name a specific group that does research.

[...] I will frequently go to Gamasutra to see if there’s anything posted there, or the GDC Vaults”; “I don’t [remember any academic influences on my work], unless it’s articles that come up on places like Gamasutra”). They also expressed strong enthusiasm for attending game developers’ conferences, which were characterized as essential for exchanging practical research information (“the most direct influence comes from places like GDC when we’ve come here to soak up the knowledge of other developers”; “[GDC is] an inspiring place and it’s an invaluable resource”; “if you want to learn the best of what’s going on in the craft, you’ve got to go to GDC San Francisco”). This positive opinion of non-academic conferences was to be expected, since most of the developer interviewees were recruited in that context. An interesting point on the preference for trade conferences over academic papers was offered by an interviewee when commenting on the pace of change of game industry (“I feel like we can move faster at conferences than you can with writing, writing and reading papers and books”). The cautious pace of academia was also cited by another interviewee as clashing somewhat with personal priorities (“I’m less interested in the traditional academic language of things and the lengthy writing and sourcing and stuff, that I see the value of but that costs me a lot of energy”).

Analysis of the researcher interviews revealed a similar view of there being a separation between the research priorities of academia and industry, with industry being seen as more interested in the commercial implications of design decisions. However, a picture of compartmentalisation within social science games research itself emerged. In this regard, three distinct research trends can be identified: one investigating causal effects of mainly commercial video games (mostly coming from psychological research); another that is outcome oriented and focused on the use of applied or serious games for educational purposes; and thirdly, an emerging field that considers games as media and is interested in how commercial games influence cultural practices, identities and politics. This partitioning of academic research was characterized by some as problematic and stemming from a lack of communication between different traditions, especially between better funded outcome-oriented research and less quantitatively-oriented sociocultural investigations. (“Unlike some of the games research that I tend to come across where researchers are really interested in ‘does a game increase this, does a game lead to more motivation or better outcomes’, what I’m more interested in

asking about games is more a process point of view [...] actually really looking more closely at the role of interactions, social interactions that are happening around games. So, more a sociocultural perspective, perhaps [...] [the dominant academic perspective] would be the outcome oriented perspective. [...] The kind of evidence that many funders are asking to really prove is, I guess, that games are effective learning tools”).

One area where social science research and game development seem somewhat less disconnected is in serious games R&D. It is not uncommon for this to be undertaken within publicly-funded research initiatives. However, economic pressures can make it a harsh environment, especially for research purposes (“there are companies that make a living out of that. [...] you have to go in a short period, understand something, turn it into a game, deliver it in a way that it works. Otherwise you’re not going to get the next gig. And that all happens in three, six months if you’re lucky. [...] when you’re working commercially you’re not pushing the boundaries, you are literally trying to squeeze out”).

Whereas the spheres of research and game development appear somewhat disconnected, social sciences academic research seems more suited for addressing the needs of educational innovation. This was clearly borne out in the interviews with educators, many of whom mentioned being directly engaged in research activities and roles (“I first tried out using a digital game in my school class [...] I got interested in games, also from educator’s point of view, and later on from a researcher’s point of view”). Some educators also mentioned sourcing games-related research findings (“we wanted to play a World War II based first person shooter with the kids because we’d read some research that said that the visual processes when you’re playing FPS, first person shooters, are quite similar to the visual processes that go on when you’re learning to read”). This fluidity of pursuits and roles is not unusual in the game based learning field.

However, similarly to the divergence in priorities that characterizes the relationship between academic research and commercial game development, some interviewed educators called for support mechanisms that are less theoretical and research oriented and more practical in nature (“it’s more than just bringing a game and playing in the classroom. So we need to really create some form of framework [...] not an academic tool [...] [but] a practical tool”).

Some educators expressed the view that research-led development of successful serious

games for learning is inherently fraught with limitations (“quality obviously suffers, even when the know-how is there, [unless] researchers can team up with well-heeled developers”). Since a number of educators interviewed expressed greater enthusiasm for the employment of entertainment games, the need of a closer relationship between developers and educators was stated (“developers [should work] with teachers [...] and with the focus not to create serious games, but to create games that *enable* learning processes that can be [of] benefit to teachers and students”).

When it came to making recommendations, educators not only advocated closer collaboration among the various stakeholder groups, they also called for greater sharing of research results (“Dissemination should be as broad as possible, addressing institutions, players, developers, parents, educators, etc.”)

During analysis of the player interviews there was no expectation that interviewees would make mention of academic research. However, two of them reported being familiar with academic research on the use of entertainment video games for rehabilitation (“I think there’s a study, they compared Lumosity which was that game made by neuro-scientists or whatever to help people with memory and things like that. They did a kind of test between people who did that and people who played Portal”; “There was research at my school about using Guitar Hero for hand rehabilitation, and I’m so down with that [...] There’s been a lot of research on [using games for post-traumatic stress disorder]. I’ve tried to find some, but it’s really hard.”). Another player was familiar with the psychological research literature on addiction and very critical of its stance (“addiction models in psychology in general are tremendously flawed and written through with a lot of implicit ideological assumptions about how people should spend their leisure time [...] [There are] some very condescending opinions on [...] free will and [managing] one’s own time”). None of the players commented directly on the relationship between game development and academic research, but some did report the feeling that there was a great deal of research behind some game design decisions (“[some free-to-play games] are carefully studied and designed to be addictive”; “they give an immediate visual and auditory reward... there is for sure some careful study behind [it]”).

4 DISCUSSION

Both the literature review and the interviews yielded valuable insights regarding factors contributing to the disconnect between game research and game development.

The first such factor is that social sciences research has a tendency to be more tentative than categorical in relaying its findings. When considering games-related research, definite conclusions are rare even for the most extensively investigated topics, such as whether frequent gaming activity leads to improvements in memory, attention, etc. While caution in drawing conclusions from (uncertain) results is certainly a good practice from the scientific viewpoint, it may well prove frustrating for a game developer seeking clear-cut answers to inform practical decisions. Moreover, researchers' tentativeness in interpreting outcomes often blinkers them from making pragmatic considerations about the potential applicability of those findings. This is compounded by the fact that most of the recommendations we identified, especially in the psychology literature, were addressed to other researchers. Indeed, the relative lack of recommendations directed to game developers, educators, or policy makers may give the impression that the social sciences academic community is largely self-referential and unconcerned with generating outcomes of practical significance. However, it should be acknowledged here that the full papers considered in the literature review mainly comprised highly cited literature reviews and meta-analyses, which could be seen as part of the internal discourse of academia.

The interviews with developers confirmed this characterization, as they believe that academic research doesn't offer answers to their questions. This is not only a matter of overall inconclusiveness of results; it is also a matter of the kind of questions being asked. Obviously, those emerging from the games industry, especially in the AAA sector, are driven by the need to meet market demands for new and better products. By contrast, the overriding goal of social science research is to gain understanding of gaming related phenomena, and is less concerned about market applicability. However, a desire for research with clearer practical applications was also expressed by educators, who, as stakeholders, are less bound by commercial considerations than developers are.

A second factor contributing to the disconnect is the different pace at which game development and academic research advance. This, too, is connected

with the divergence in the respective priorities of development and research: the former prioritises rapid innovation and exploitation of market opportunities, while the latter pursues steady accumulation of knowledge and the careful drawing of conclusions. From the viewpoint of game developers, research risks being perpetually outdated, investigating specific games or game mechanics that have since lost their leading edge position on the market. The (often considerable) time lapse between a manuscript's completion and its publication exacerbates the untimeliness of research (Björk and Solomon, 2013).

A third factor contributing to the disconnect is the relatively low accessibility of much research output for stakeholders outside academia. This regards both the language used, described by some interviewees as overly technical, and the channels adopted for dissemination, which appear unfamiliar to many. These accessibility factors seem to have afflicted the interviewed developers in particular, whereas comments from the educators we interviewed - and even some of the players - suggest that the language and culture of social science research is more familiar to them. Accessibility issues, combined with the other factors mentioned above, may further discourage the game developer from keeping up to date with current academic understanding of game-related phenomena.

Lastly, the Gaming Horizons literature review and the interviews revealed how strongly social science research focuses on serious games, which is perhaps not surprising given that they are designed with the explicit intent of generating specific - and presumably measurable - outcomes. Considered collectively as a stakeholder group, however, game developers are more commonly concerned with the creation of games for entertainment. The impression that social science research is 'looking elsewhere', so to speak, limits developers' potential interest in it. On this point, it's important to note that some of the educators we interviewed were chiefly interested in the use of commercial entertainment games for educational purposes. This could well represent a research line that serves as a meeting point for game developers, researchers, and educators alike.

Before proposing concrete steps to address the research-development disconnect, it should be acknowledged that these two spheres embody priorities and pursue aims that are quite distinct from each other. So the spaces that they occupy in the games landscape cannot be totally bridged, nor is it desirable to do so. That said, however, steps may be taken to ameliorate connections for mutual benefit.

One possible step is the promotion of information sources that sit in between the academic and development worlds, such as conferences addressed to and involving both researchers and developers. Blended conferences present four main advantages: one, they allow relatively rapid dissemination of scientific results; two, participants from both backgrounds have an opportunity, and a strong incentive, to communicate in a way that is readily understandable outside their own cohort; three, conferences are generally more familiar to developers as a dissemination channel than academic publishing is; and four, they present an opportunity for personal interaction that may spark collaboration and the eventual formation of multidisciplinary endeavours.

Another possible area of action is to encourage social science researchers who are seeking to disseminate findings on games and gaming to target channels like websites, blogs and social networks that are popular with the game development community, adjusting their message and language to suit this audience. For example, the Gamasutra website⁴ was mentioned by a number of interviewed developers as the primary hub for information on innovation in game development.

Another step that may be taken to reduce the disconnect is to encourage greater and more diverse social science research into entertainment games and gaming, seen as opportunities for leisure, as socio-cultural phenomena and as potential tools for application in fields like education, health, and rehabilitation. Gaming Horizons interviews with educators suggest that the employment of entertainment games for learning may avoid some of the problems they encounter with serious games, especially regarding the effect of production values on student engagement (e.g., outdated graphics limiting engagement). Shifting the focus of social science research away from the development of games with specific purposes and more towards investigation of the various ways entertainment-oriented games might be geared and/or harnessed for learning could well help to bring developers, researchers and educators together for mutual benefit. Additionally, considering games as socio-cultural tools can open new ways of using them in education, such as using game narratives and mechanics for introducing discussions on ethics.

Furthermore, much stands to be gained from initiatives and mutual agreements supporting wider access to data sources. The Open Science movement

is producing important effects in terms of policies about data and publication openness which are making research results more and more accessible. On the other hand, the industry gathers a wealth of critical data from gaming ‘in the wild’. This could give social science research new insight into areas like gamer behaviour and group dynamics in virtual environments, knowledge that would prove particularly beneficial for designing and developing game experiences that have strong market potential. However, our interviews reveal that business competitiveness is still hindering this side of the communication channel between research and game development world.

The signs of interest in academic research, both from a social sciences and a humanities perspective, expressed by game developers we interviewed strengthens our belief that there is indeed room for fruitful collaboration between the two ‘worlds’.

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⁴ <https://www.gamasutra.com>

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