When in Memeland, Speak in Memes: contributions of design towards the betterment of online behavior regarding public health.

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Abstract. This research tackles a current tendency towards scientific mistrust among segments of the population: we posit that channels traditionally employed by scientists and policy-makers may not be sufficient to reach skeptical individuals and communities, as exponentially and pervasively evident in social media circles. We thus propose to explore informal online channels and formats such as memes, short videos, and forums, where the involved demographics tend to obtain information they deem reliable and relatable: in fact, formal channels of scientific communication are often regarded by skeptics as authoritarian and driven by obscure agendas. In this research, we focus on health policy behavior as a locus of conflict in recent years due to the pandemic, with Portugal as a case study. Informed by both online field work and in-person interviews with health policy skeptics, the project has so far produced a collection of visual artifacts for social media circulation. Validated specimens aim to become templates for the adoption of health policies.

Keywords: Design for Science, Health policy, Social Media Design, Pandemic memes, Science communication in Portugal.

1. Introduction

Fig. 1. Doge meme generated by the authors.

Recent empirical and documented evidence has been pointing towards online social media as a primary factor in the rise of scientific mistrust (Yeung, A. W. K., et al., 2021; Brownell, S. E., & Price Jr., J. V., 2021); the issue became particularly pressing during the recent global pandemic. We therefore posit that both the semantics and contexts employed by scientists and decision-makers in their pedagogical and persuasive attempts may benefit from addressing emerging, informal online channels and formats. This hypothesis is informed by public health and psychology studies that reveal frequent cognitive biases that tend to evade fact-based persuasion (Betsch et al., 2010; Broniatowski et al., 2018; Donzelli et al., 2018; Igoe, 2019; Gerts et al., 2021), as well as the observation of a potential over-formalization of channels of health policy often regarded by population segments as authoritarian and elitist (Frosch, D. L., May, S. G., Rendle, K. A., Tietbohl, C., & Elwyn, G., 2012).

We further posit that communication design may play a specialist role in this calibration of health policy behavior in social media platforms: we aim at testing the possibility of a pedagogy of science and behavioral persuasion through the adoption and configuration of memes, infographics, short videos, data comics and humorous textual content. This possibility is in line with both the aforementioned evidence of subjective components in cognitive processes, and the roles of communication design as a harmonizing agent between the rational and the expressive.

Empirical evidence has been largely collected during the COVID-19 pandemic in the context of Portugal, namely in regards to confinement rules enacted by the gov-

ernment, daily statistics and outlooks provided by health authorities, and vaccination programs set from early 2021 onwards. The largely failed employment of a tracking mobile phone app has been observed as well, both as an indicator of a possible over-reliance on digital technology, and as evidence of a self-imposed limitation on the semantics of digital communication.

It must be pointed out that the present research is not focused on occurrences of flat-out science denial, including so-called complementary and alternative medicine practices (Coulter et al., 2004), nor conspiracy theories as collective phenomena of mobilization: both the motivations and socio-ideological dynamics of these radical expressions tend to entail a degree of cognitive and behavioral entrenchment that memes and data comics, however accessible, would inevitably struggle to address; instead, the research chooses to focus on relative degrees of hesitancy and inability to process, translate and apply complex reliable information in daily contexts (Figure 1).

The objectives of the research can thus be summarized as:

- To test the viability of employing social media content to engage audiences that are skeptical or hesitant regarding the adoption of public health policies;
- To acknowledge and employ subjectivity and expression as rooted components of a reliable engagement with public health;
- To contribute to the promotion of civic vocation in participatory online media;
- To broaden the scope for more receptive and engaged dynamic between scientific knowledge, and citizen narratives and expectations;
- To broaden the scope of design studies and practice among contemporary online phenomena;
- To legitimize exploratory roles design may perform in the receptivity of health policy within emerging media contexts;
- To translate complex health information, knowledge and data into broadly accessible and persuasive formats.

Despite the specificity and ambition of the aforementioned objectives, it must be emphasized that the project follows an overall exploratory approach; both the volatility of social media (in its nature and impact) and the unique circumstances of the recent pandemic, dictate an ability to open up to potentially unprecedented approaches to design. As a consequence, the above objectives are primarily regarded as long-term outcomes of a consortium of interested parties, with an iterative methodological vocation; within this broader scope, the tangible aim of the present, exploratory project is primarily to open up a space of scrutiny and possibility, along with the respective seeds of engagement.

2. State of the Art

The recent global pandemic crisis (COVID-19, 2020-2022) has presented multiple challenges to scientific development and policy implementation: among a diverse range of responses, both by authorities and citizens, Portugal stood as an overall successful case of viral containment by social behavior and vaccination implementation:

explicit dissent was rare, and episodes of public hostility even more residual. However, three core issues remained throughout:

- A general absence of a tangible, accessible communication strategy on the part of authorities was evident: a press conference in a formal environment frequently employing hermetic terminology was broadcast daily on open TV channels (Serviço Nacional de Saúde, n.d.); the press conference was accompanied by fairly abstract and generic slogans, devoid of concrete information or instructions ("Protect yourself", "We will beat the virus", and "Take care of yourself, take care of others") (Figure 2).
- The attempt to trace infections through mobile phone technology (Oliveira, R., & Mendonça, J. M., 2020) largely proved to be a failure, even the subject of ridicule (Pinto, S., Oliveira, E., & Costa e Silva, E., 2021);
- A discreet segment of the population chose not to follow governmental instructions, due to a multitude of reasons including suspicion of the timing of the vaccine, privacy and surveillance concerns, superstition, and a trust in alternative tips and therapies primarily disseminated through online platforms - as ratified by Dimoff, J. D., Dao, A. N., Mitchell, J., & Olson, A. (2021).

Fig. 2. Still from daily press conference by Portuguese National Health authorities during the pandemic, broadcast live on national television. Source: Serviço Nacional de Saúde, n.d..

With regards to the first issue, successful examples of tangible instructions were identified, such as a campaign for mask wearing that makes effective use of subjective components (Figure 3) - thanking people for wearing a mask, rather than imposing it, and having actual individuals (health workers) setting the example in order to provide a more personal semantic of engagement. However, examples of positive communication were still the exception.

Fig. 3. Examples of positive reinforcement campaign employing testimonies and gratitude. Source: Serviço Nacional de Saúde, n.d.

On the other hand, the issue of pandemic containment through digital technology can essentially be regarded as a deterministic endpoint of over-reliance on big data; despite the promise of its theoretical model, its implementation proved impossible: it would involve complex processes of registration, activation, professional involvement, and software update. When the Portuguese Prime Minister suggested the possibility of its mandatory use, the software became the subject of irreversible ridicule - this, adding to the debate on the aforementioned issues of privacy and governmental surveillance. This approach to pandemic containment, we argue, suffered from both a degree of digital dogma and a lack of awareness of subjective components, while breaking a tacit yet pervasive contemporary expectation that the vocation of mobile technology be driven by entertainment and ease.

However, the core issue under discussion in the present research is the understanding that most instances of skepticism occurred due to both a lack of accessible and concise information, as well as an over-formalisation of health policy discourse on the part of authorities - as proposed by Dillard & Shen's "Theory of Psychological Reactance" (2005). As traditional media channels focused on intricate statistical and infographic representation of the pandemic, online media channels engaged in a diametrically opposite exercise: humorous content as a tool for overcoming anxiety (Figure 4), slogans, expressions of solidarity, and personal testimonies. The problem, however, was that this largely benevolent and innocuous content randomly coexisted with misleading health information, factual manipulation and statements of a conspiratorial nature, and wellness philosophies aspiring to become an alternative to scientific efficacy. Furthermore, the appeal of this latter content was rarely matched by reliable sources of information and pedagogy: given the choice between a formal governmental edict and an ironic set of enjoyable memes, however questionable, a large segment of online users instinctively gravitate towards the latter. This was empirically witnessed and experienced by the authors as

design and media researchers, and as citizens and online users themselves during the various stages of the pandemic.

Fig. 4. Y U NO meme generated by the authors, based on empirical analysis of pandemic memes.

On an international level, specific entities attempted to reconcile this dichotomy by employing online languages and aesthetics in their official communication; an example is the set of memes and tags created by the U.S. National Foundation for Infectious Diseases (Figures 5 and 6). These were made available on their website, along with the message: "Share these infectious disease memes to help spread awareness, not disease. Select an image below to view a full size version and save to your device. Share on social media with the hashtags #GetVaccinated, #VaccinesWork, and/or #FightFlu. Tag your friends and family to remind them to #GetVaccinated to help stay healthy!"

Fig. 5. Example of meme made available by the U.S. National Foundation for Infectious Diseases (n.d.).

It is this type of engagement that the present research attempts to pursue, by further weaving authoritative health information and policy into social media, and by generating specimens and prototypes covering subjective behavioral response. Subsequently, we expect to propose an equivalent harmonization of formal and informal channels of communication in the Portuguese context.

A proposition on the recent pandemic could be regarded as redundant, given its retrospective nature. However, we argue for its validity for two main reasons: firstly, the design and management of communication during the pandemic contained an inevitable degree of improvisation as the crisis unfolded, with little time for the strategic analysis that may now be ensured; and secondly, the present study ultimately aims at being relevant and partially contributive to future crises scenarios.

Fig. 6. Example of meme made available by the U.S. National Foundation for Infectious Diseases (n.d.).

3. Literature Review

Numerous studies in recent years have highlighted the influence of the internet, and in particular, social media towards scientific literacy and population behavior (Kata, 2010; Mitra et al., 2016; Benoit & Mauldin, 2021). The emerging general consensus is that the casual and unregulated nature of social media has profoundly altered access to reliable information, and changed the way knowledge is approached and disseminated (IDA, 2018; Benoit & Mauldin, 2021). This new "boundless ecosystem" (Karafillakis et al., 2021) has inevitably affected conversations on public belief: stud-

ies suggest that while the immediacy and informal nature of social media may appear to provide an advantage to thought leaders towards influencing public perception (IDA, 2018), it also fosters an unmediated spread of misinformation (Chou et al., 2009; Keelan et al., 2010; Igoe, 2019).

This "infodemic" of differing veracities is presently in sharp focus since social media platforms acting as vectors are actively scaffolding the spread of wrong and unfounded information (Wang et al., 2019; Puri et al., 2020); recently, it has undermined worldwide efforts towards controlling the COVID-19 pandemic (Gerts et al., 2021; Loomba et al., 2021; Demuyakor et al., 2021). The sheer bulk of varying information has also aggravated the mistrust of data linked with risk perceptions and safety of the vaccines (Kennedy et al., 2021), thereby driving hesitancy and risking further lives (Wilson & Wiysonge, 2020; Latkin et al., 2021; Loomba et al., 2021; Chadwick et al., 2021).

One of the ways in which studies have sought to determine the underlying factors is by profiling anti and pro vaccination individuals and groups in terms of their communication behavior on web and social media (Davies, P., & Chapman, S. & Leask, J., 2002; Arif, et al.; 2018; Broniatowski et al., 2018; Igoe, 2019). Results correspondingly show that whereas pro-vaxxers tend to quote scientific literature and population-based statistical evidence when sharing views online (Betsch et al., 2010; Faasse et al., 2016; Xu et al., 2019), anti-vaxxers generate content based on personal opinions and emotional experiences which resonate with their target socio-demographic audiences (Bessi et al., 2015; Donzelli et al., 2018).

A further scrutiny of thought leaders driving the anti-vaccination movements reveals that in conjunction with celebrities who use their prominence on social media to speak on topics that they are not experts in (Igoe, 2019; Herrera-Peco et al., 2021), there are social media influencers who spread scientific sounding disinformation by providing "misleading causal explanations" (Igoe, 2019). Correspondingly, there is evidence that since individuals exhibit a greater proclivity towards engaging with negative information around vaccination than positive views (Blankenship et al., 2018; Li et al., 2020; Puri, et al., 2020), a fraction of anti-vaxxers, who produce a majority of content, can cluster audiences and become "echo chambers" (Levy, 2021; Karafillakis et al., 2021; Demuyakor et al., 2021; Jiang et al.; 2021) for further amplification. Conversely, content producing pro-vaxxers have been found not engaging sufficiently with a broader community with similar concerns (Demuyakor et al, 2021). Adding to this is the plain evidence that scientific knowledge tends towards epistemological complexity and disciplinary hermeticism, whereas disinformation tends to offer a readily understandable reading of the issue at stake; consequently, “people learning about topics are vulnerable to hubris” (Ballantyne and Dunning, 2022). Furthermore, the ample evidence of this polarization indicates a pressing need for a third stance towards mutual engagement: we thus argue that a dialogue may be fostered within a shared dialectic involving scientists, policy-makers and moderate skeptics.

This research, accordingly, posits that to understand, and specifically, to mitigate such occurring antagonisms within the general public towards the filtering and processing of relevant information in matters of health and safety, it has become

imperative for governing bodies to examine and incentivise forms of new media that are actively demonstrating the capacity to engage and influence public opinion. Memes, as Nieubuurt (2021) indicates, hold the ability to function as digital propaganda leaflets in the same way as their analogue antecedents, bonding people under an idea. As exploratory signs with semiotic reasoning, they are a "tool for cognitive representation" (Scherz, 2022). Furthermore, as stated by Grace and Fiyinfolu (2022) , "[...] satire, music and comedy are not just made to make the audience laugh; the underlying issue is for them to be used as tools for reforming the society."

The study elaborates its mapping from the aforementioned COVID-19 crisis, particularly in the Portuguese context, as a primary case study, from where it endorses to understand, and specifically, to employ it as source material towards the organization of taxonomies and communication patterns, including visual and discursive ones. This will enable the integration of findings on the allowances and affordances of designing reliable health information in public health research and communication, namely for online social media contexts.

4. Methodology and Preliminary Findings

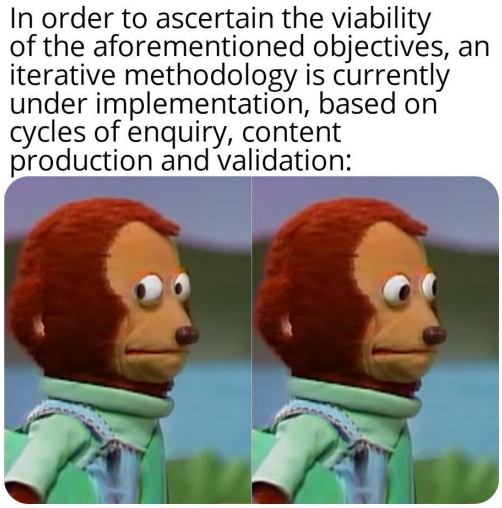

Fig. 7. Self-reflective meme generated by the authors.

The present study is being informed by the retrospective analysis of empirical recollections and collection of online specimens and discussions during the pandemic; this empirical activity took place mostly on Facebook, from the onset of the pandemic up to its gradual replacement by subsequent global narratives. Despite a predominant non-participatory approach in order to ensure the neutrality of the observation, the occasional written online exchange in comments and forums largely confirmed an

entrenchment of users' beliefs, often mistrustful or derisive of official health communication channels and content.

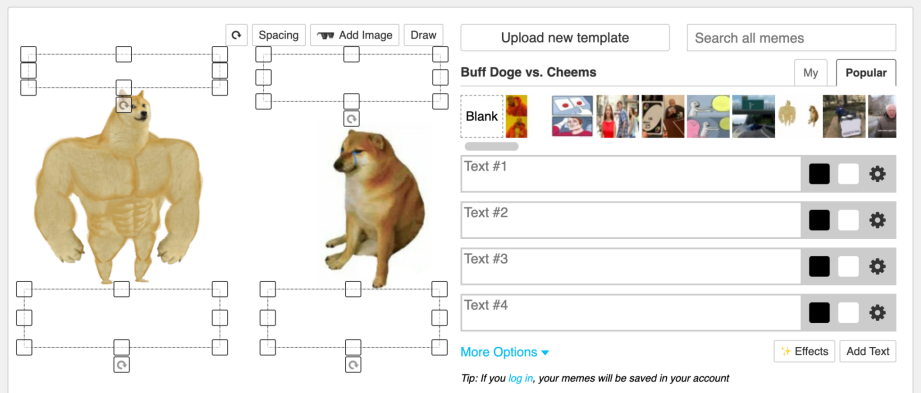

Fig. 8. Example of imgflip meme template and user interface: Buff Doge vs. Cheems Meme. Source: imgflip.com.

The above content and experience has therefore paved the way for both an empirical identification of characteristics to be employed by reliable sources in order to reach skeptical online segments, and an exploratory production of meme prototypes. These have mostly made use of the popular online meme generator "imgflip", thus ensuring both a semantic recognisability upon the employment of popular meme imagery, and an intuitive interface with user-friendly design tools. An example of a pre-existing visual template and user interface is presented as Figure 8.

Fig. 9. Metaphorical meme with pedagogical component, generated by the authors.

A set of ongoing in-person interviews with COVID skeptics complements the aforementioned participant observation, where anonymity is offered as desired by interviewees. Patterns running through these interviews include:

- Skeptical subjects tend to avoid calling themselves “deniers”, while in fact they do often deny the efficacy of vaccines, or bundle their suspicion with broader geo-political stances that include financial interests on the part of pharmaceuticals and governmental motivations;
- There seems to be a prevalent suspicion of official channels of communication (television is mentioned often), accompanied by a degree of pride in resorting to alternative means of information such as personal youtube channels.

The aforementioned activity has been complemented by the design of a series of creative activities, where both members of the research team and design students have been generating meme prototypes for online and offline engagement, trust and pedagogy. These activities have so far included private weekly online responses to pre-selected meme imagery, the organization of exploratory meme generation and discussion sessions with team members (Figures 7, 9 and 11), and the curricular insertion of meme production workshops in Design and Digital Media Arts courses, as well as an exploration of online/offline engagement by printing out generated content, thus opening up further contexts of resonance (Figure 10). Further iterations of these various actions will ensure gradual cycles of validation and adjustment (Figure 13).

Fig. 10. Classroom workshop in the scope of the present research group activity. Photography by Cláudia Raquel Lima.

We regard this latter activity as particularly relevant, as it brings input by younger generations with a more intricate perspective on online dynamics, circulation and semantics, while allowing personal testimony to play a key role in engagement.

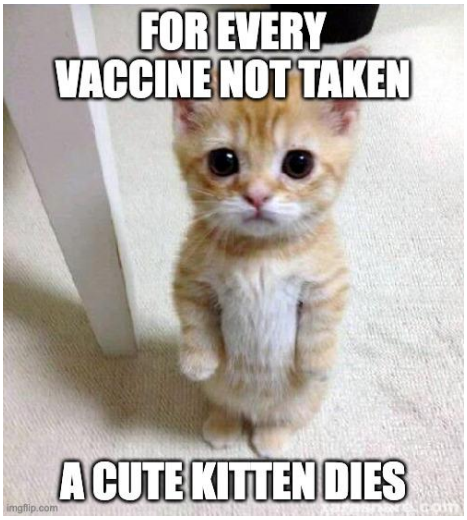

Fig. 11. Humorous meme generated in project workshop context.

Fig. 12. Setting up a display of meme printouts for open feedback at an international visual methods conference. Photography by Susana Barreto.

Concomitantly, these various outputs are being shared within the context of events and channels of scientific dissemination - conferences, posters and articles (Figure 12), in order to further open the debate on the legitimacy and efficacy of using meme aesthetics and semantics in the persuasion of skeptical individuals and communities.

Online presence remains discreet, while pondering the resolution of viral dissemination versus centralized communication on the part of the research.

Empirical findings emerging from the above activities include the following:

- Humour tends to be pervasive in social media, and proves to be an effective device for engagement;
- However, with the above in mind, irony-based humor tends to both antagonize dissenting views and entrench viewpoints;
- Caption-based memes using pre-circulating imagery denote a knowledge of the medium, and therefore tend to legitimize those producing and sharing them (Figure 7); other graphic elements such as specific typefaces may still ensure a level of familiarity among online users;
- Nevertheless, pre-circulating imagery does not need to be the exclusive visual source: memes may be constructed from original images;
- Tangible metaphors tend to be useful in illustrating complex information and knowledge, thus rendering them more accessible and understandable by online audiences (Figure 9);
- Personal testimonies tend to more readily engage with the readers'/viewers' subjective components;
- Content production should avoid mission statements that, in themselves, may preemptively invalidate the possibility of engagement. Providing content on a smaller, case-by-case basis may prove to be more efficient than gathering it under an encompassing viewpoint that may be regarded as patronizing or antagonizing.

We argue that these empirical findings are convergent with Dillard & Shen's "Theory of Psychological Reactance" (2005), in that they support individual freedom-restoration of freedom, and give the individual the notion of being a part of the communication/solution - rather than enduring an authoritative type of communication/solution.

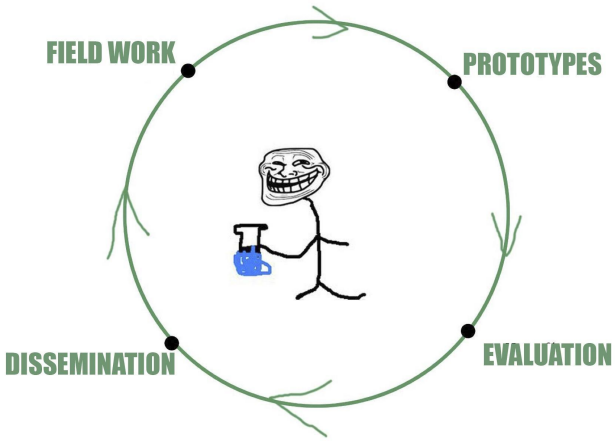

Fig. 13. Project methodology summarized in meme format. Source: the authors.

Despite the gradual emergence of these empirical findings, given the aforementioned, unprecedented factors at work (as well as the intrinsic degree of complexity), full validation and measurement can only expect to be addressed as longer-term goals, namely through extrapolation and cross-disciplinary analysis; however, preliminary response from participating students and design peers has largely confirmed both the pertinence of the proposed engagement and the potential of generated specimens.

5. Outlook

The present research posits that communication design and media arts may contribute to a constructive engagement with science and health policy skeptics in online environments. It acknowledges prior, psycho-cognitive evidence that knowledge and beliefs are not solely constructed by logic and factual information, but rather contain subjective components: it is precisely within this territory of subjectivity that we propose design may contribute, by employing online humor, aesthetics and symbolic validation as valid tools for a pedagogy of health policy behavior.

The case study of Portugal in the COVID-19 pandemic is the focus of the present research: both official and unofficial communication channels are being covered and analyzed, aiming at diluting the polarized perception whereby one is dogmatic and the other is unreliable (Figure 14). Methodologies include online ethnography, the collection of empirical evidence, retrospective access to documentation and memorabilia, the identification of underlying taxonomies, semi-structured interviews, and exploratory sessions in both research and learning contexts.

We expect further iterations (Figure 13) to validate produced materials, resulting in a set of prototypes and recommendations for science communication in online contexts that may effectively incorporate subjective components as pedagogical assets rather than impediments, as well as arguing for a core contribution of design in online behavioral changes regarding public health. Additionally, these further iterations will diversify the range of approaches beyond the premises of meme culture and Facebook, in order to include platforms, genres and formats such as TikTok, data comics, and critical readers.

Fig. 14. Meme addressing the apparent conundrum of the present research. Source: the authors.

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