

An investigation into generation Z's mindsets of entertainment in an autonomous vehicle

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ABSTRACT

Alongside the development of digital life, certain concepts gain new dimensions among new generations. When entertainment is the subject, it creates emergent desires, behaviours and mindsets in the social and consumer cultures. However, existing perspectives around in-car entertainment do not fully embrace the digitally dynamic environment in which Generation Z is heavily involved. This paper uses the future autonomous vehicle's interior context as a case study to understand Gen Z's meaning change around in-car entertainment. It draws on a qualitative research methodology by combining semi-structured interviews with design metaphor activities to understand Gen Z's altered mindset with the impact of digital technology. As ultimate findings, eight different in-car entertainment mindsets of Gen Z emerged: *Effortlessness Seeking*, *Sense of Belonging*, *Balance Seeking*, *Authenticity Seeking*, *Advocating*, *Decision-Making*, *Creating* and *Interacting*. The implications of an autonomous vehicle's entertainment experience were discussed. It is expected that this study will contribute to understanding the shifting mindset and behaviour of Gen Z in how they desire to entertain themselves within an autonomous vehicle. The study suggests what to consider regarding maximising in-car entertaining experiences for Gen Z.

1. Introduction

Entertainment is at the core of self-expression, comprehension and recreation for many cultures [1]. It is discussed in various contexts, from the Hedonism of Epicurus to the smartphones of today's world [2]. The significant roles of entertainment have been emphasised across different disciplines, such as in education, by demonstrating components to increase student engagement and learning outcomes [3], in health, by showing its impact on reducing mental illness stigma [4], in computer science, by using it as an inspiration for creating robotic solutions for real-world problems [5], and in the workplace, by influencing employees' job performances [6].

Entertainment affects people's daily lives, which is reflected in the increased time spent on and demand for it [6]. Especially, its benefits in consumption and commercial culture are prominent. The impact of entertainment on various aspects of modern life has been proved, such as on consumer behaviour and emotion [1,7,8].

One study [9] highlighted the importance of entertainment by asking participants to compare the monetary value they would require to give up television for the rest of their lives—more than half of the

participants required at least one million dollars as compensation for giving up entertainment. Some viewpoints emphasised entertainment as a commercial culture [1] or as a culture offered in exchange for money [10]. Entertainment is discussed and acknowledged widely as a monetary value-producing concept that contributes to business continuity [8]. It provides large audiences with what they desire in particular situations. From Shakespeare's productions to contemporary entertainment technologies and consumer culture, the role, effects and forms of entertainment are continuously changing [11].

The amount of time that people voluntarily spend on entertainment and the circulation of entertaining products and services is increasing [1]. In this research, the autonomous vehicle (AV) was chosen as a space to explore because, increasingly, more leisure time on the road will diversify entertainment interactions and systems. Considering AVs are expected to become increasingly prevalent in consumer culture [12], it seemed beneficial to understand the changing mindset of potential users' entertainment expectations.

Gen Z has a significant role in contemporary culture as the generation most impacted by technological change [13]. Gen Z's position as future consumers and producers means it will have a substantial impact

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on various aspects of entertainment. It is thus essential to examine how Gen Z's perception of the notion of entertainment is evolving in different contexts. This understanding might help shape specific social frames on culture and human behaviour and enable producers, designers, marketers and industry practitioners to better fulfil human expectations by adding more value to their conception and creation processes. This paper aims to investigate Gen Z's mindset around AV entertaining experiences in their constantly connected digital lives. It starts by illustrating the related work, then it demonstrates how the studies were conducted and data were analysed. Finally, the results are discussed regarding how Gen Z's mindset influences AV entertainment experience design.

2. Related work

2.1. Understanding the foundations of entertainment

The accelerated interest in popular culture and entertainment has expanded discussion around its scope [14]. However, Lieb [15] observed that theorists have broadly failed to explain "what entertainment is, what kind of functions it inherits, and how much further it may expand". Even though there is no consensus on the systematic definition of entertainment, there are plenty of interpretations and predictions about it [16]. Along with studies that demonstrate and emphasise the importance of entertainment, some studies focus on its definition, content and components.

Typical representations of entertainment consist of comedy, video games, sporting contests, novels, documentaries and history [17], films about emotionally intense events [1], theatre and performance [18], and toys and games [5]. Likewise, in up-to-date dictionaries, definitions of entertainment similarly include public shows and television, performances [19], and films and music [20].

Most studies observe entertainment by analysing the emotions and feelings in the entertainment context, predominantly indicated by short-term, positive valence emotions. Entertainment is claimed to be the most potent way to stimulate emotions [21]. Zillmann [22] summed it as "seeking mood changes for the better". Bosshart and Macconi [23] have outlined different layers of entertainment including psychological relaxation, change and diversion, stimulation, fun, atmosphere and joy. Shusterman [24] agrees, referring to entertainment as something that can provide diversion and rejuvenation. Vorderer et al. [25] mentioned exhilaration, sensory delight, relief and achievement in the same sense.

In addition, the complex aspects of entertainment are also highlighted. For instance, some argue that entertainment stimulates not only positive but also negative emotions [21], including fear, sadness or melancholy [25]. Vorderer [16] refers to it as play because of its intrinsically motivated and attractive nature and ability to construct fantasy. Some studies identify that entertainment involves a higher level of pleasure and meaning, such as psychological growth and the search for meaning [17,26], as an opportunity to reflect upon ethical virtues and eudaimonic impacts [26,27,28], or as elaborate means of communication [14].

2.2. Technological influences on entertainment

To understand the changes around the notion of entertainment, we can consider the concepts, visions, products and services around it. This change has been thoroughly impacted by the advancing of digital life, which has impacted traditional forms of entertainment by causing them to either diminish or transform. One of the significant changes is the declining need for humans' dependency on predetermined sources and schedules. As one media analyst states, "appointment-based television is dead" [11]. Recent technological improvements, including internet culture, new mediums and forms of digital life engagements and sources, and the popularity of video games, now play a more significant role in how entertainment is perceived [11].

Today, the majority of representations of entertainment present these changes. Many studies refer to video games and interactive game design examples [29] and game streaming [30] as an entertainment experience. Phan [31] states that digital games are among the most popular forms of entertainment by examining youth's entertainment through video and online games. Similarly, the growing online broadcasting and streaming platforms [32], social media [33] and discussion forums also form major parts of today's entertainment. VR, AR and mixed reality systems are more frequently considered entertainment [34].

2.3. In-car entertainment

The representation of entertainment inside a car has a long history of development. It started from simple large-scale broadcasting systems like radios, sound systems and CD players, and transformed into intuitive touch screens, seamless interactions, and flexible and comprehensive digital broadcasting and navigation systems [35]. In-car entertainment and infotainment systems have been one of the main application areas [36]. Integrating brought-in devices within automobiles, and connecting and syncing information, has upgraded the in-car entertainment experience [37,38]. Today, the paradigm shift through automation in car systems enables non-driving related tasks with relevant entertainment systems such as immersive media, games, comprehensive video streaming platforms, social networking and AR/VR or mixed reality interactions [39,40,41,42,43].

Therefore, entertainment inside a car is referred to as physical or digital technological products, media or interactions. Although there is an obvious change in the perspectives on entertainment, the meaning and mindsets around the notion of in-car entertainment have not been fully explored by taking the upcoming car users, Generation Z, into account, particularly in the AV space.

2.4. Generation Z and digitality

Since age is an impactful aspect in the new digital world [44], there are differences between various generational categories (i.e. Gen Y, Gen Z) in terms of their expectations of entertainment [45]. These expectations can be evaluated as social and cultural and as customers in the consumer society.

Generation Z is the generation impacted most prominently by technology. As a result, Gen Z is given various names, such as digital natives [46], iGeneration [47], Post-Millennials and TrueGen [48]. Although existing studies take different approaches to define this generation, this study regards this generation as individuals who were born in and after 1995 [49] because this is the most frequently mentioned delineation.

Generation Z individuals were born into and grew up with technology, such that they have a strong connection with digital life in one way or another in their everyday life [50]. Therefore, technology-based interactions impact their emotional desires [51], identity and values [13,52], personal and social activities [53] and ways of communicating [54] and therefore, their understanding of entertainment as well. For example, television is still valued by Gen X and Y. However, a significantly reduced interest is evident for Gen Z because their mindset has shifted from traditional media to smartphones and the internet [55], from reading to viewing and watching. Their heavy dependence on search engines and content is noticeable compared to other generations. A mindset difference between Gen Z and older generations is thus apparent, yet there remains a need to explore this mindset, plus their perceived meaning and emotional context regarding digitality.

The desires of Gen Z are distinctive also in terms of using digital space within automobiles, with a focus on an exclusive experience, appearance, a sense of competition with others and sharing their expertise with peers [38]. Despite the difference in Gen Z's desires being acknowledged, little research has been conducted to investigate their mindsets and the meaning behind their potential entertainment

experience inside the car. This paper takes the future AV as a case study to provide a way to understand how entertainment is perceived from Gen Z's perspective. Therefore, this study investigates the meaning, mindsets and emotional content of their connected digital life.

3. Methodology

A qualitative research approach [56] was adopted to make sense of the meaning, experience and expectations of Gen Z regarding entertainment. Two methods were combined: 1) semi-structured interviews that explore both retrospective and future perspectives and 2) design metaphors as an additional analogy process to help reveal meaning.

3.1. Methods

3.1.1. Semi-structured interviews

Semi-structured interviews were chosen for this study because this approach allows researchers to seek and reveal valuable and rich data on a focused topic [56,57], in this case, the in-car entertainment mindset. The semi-structured aspect provided flexibility and the ability to support participants to uncover subjective and sensitive issues in a comfortable and conversational way [58]. The semi-structured interview format provided agency to the interviewer to create a focus on 'in-car' entertainment, emphasise the context of AV when necessary and clarify inconsistencies within responses, particularly when participants became distracted towards a context outside of an AV.

3.1.2. Design metaphors

Metaphors, where "a word is applied to one kind of thing, to refer to another type of thing" [59], are both cultural and linguistic phenomena. They are fundamental structures in which abstract concepts are comprehended in more concrete forms, and abstract reasonings are performed. Metaphors help people understand abstract matters, including cultural values, expectations, behaviour, feelings, emotions, symbolic meaning and humour [60,61] plus unfamiliar problems, by juxtaposing them with known situations [62]. This study aims to discover the user perspectives and mindsets around in-car entertainment in an AV, so recognising the significance of metaphor for meaning-making is essential to perceiving why metaphor is relevant to this study.

Indeed, the design metaphor is one of the contemporary design methods that has recently been used in AV and Human-Computer Interaction research to re-imagine interaction within future vehicle designs and to understand relevant abstract matters [63]. Although there are a limited number of sources on metaphor usage, specifically in the AV context, some of them explored relationships between humans and vehicles. Recently, a study by Strömberg et al. [63] delved into existing relationships that could act as a metaphor in the AV context. For instance, it compared the relationship between rider and horse [64], husband and wife [65] or players on the same team [66]. Hence, employing AV-humans relationship metaphors in this study seemed appropriate to support participants to uncover meaning in an AV through relationships.

3.2. Material design

3.2.1. Constructing interview questions

All of the interview questions were open-ended, providing more in-depth, lengthy and rich data while giving the participant the ability to respond in a free form [67]. Questions were often accompanied by follow-up *why* or *how* questions to extract deeper insights.

Exploring meaning as one of the essential human abilities can require structured knowledge when the meaning's scope is less explicit and more implicit [68]. Interview questions in this paper were inspired by ethnographic interview questions aimed at finding both tacit and explicit knowledge based on participants' experiences [68]. In the question construction process, several ethnographic interviewing

strategies such as the Taxonomy of Ethnographic Interview Questions [68] and the meaning-discovery principles [68] were adopted. For example, *grand-tour questions* helped us understand participants' daily life with regards to entertainment. Similarly, the *hypothetical questions*, the *use principle*, and the *contrast principle* [68] were used to reveal meaning. For example, questions about the concepts participants found most boring and unentertaining were used to understand their most unsatisfactory and entertaining in-car experiences. It is thus evident that ethnographic interviews provided substantial inspiration during the question preparation process.

3.2.2. Designing design metaphor cards

Design metaphor cards that represent the relationship between humans and AVs were designed by the researchers for this study. They contained an image, description, quote and bridging concepts, which were constructed by following the metaphor card generation guideline [69]. Initially, 22 metaphors were extracted from the current literature [63,70]. The criteria of similarity, obscurity and unfamiliarity were applied when excluding certain metaphors as these would cause inconveniences in the metaphor adaptation process [63 60]. Then we refined them to 8 metaphors (see Fig. 1).

3.2.3. Interview process with design metaphor activities

The interview process with 14 questions was intentionally composed of three different parts.

The first part aimed at extracting the meaning of entertainment and digital life. Four main questions, including sub-questions, were crafted specifically for this purpose, and the perception of Gen Z was observed from different perspectives. For instance, the questions explored

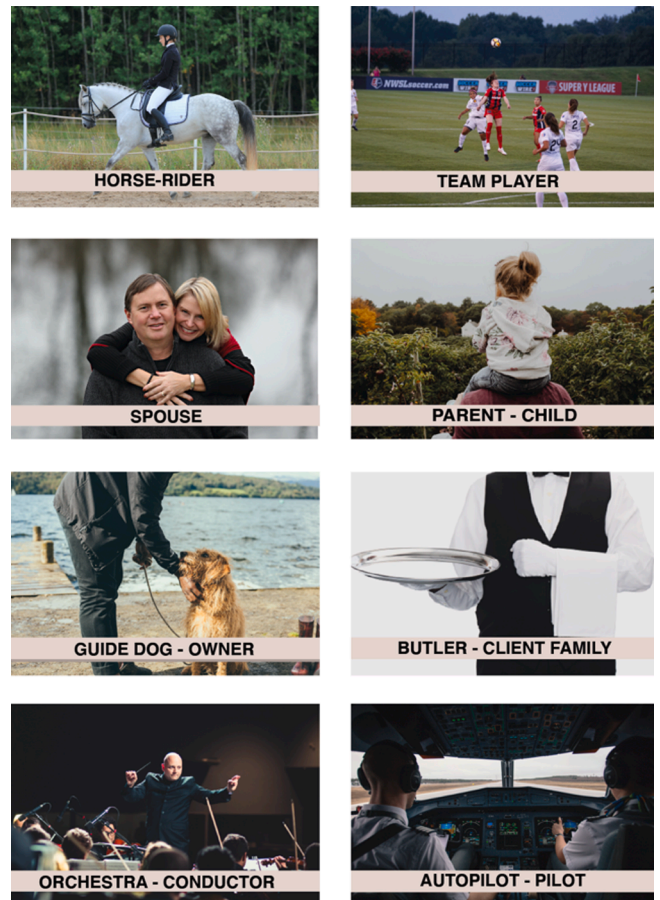


Fig. 1. Metaphor cards that represent the relationship between humans and vehicle.

entertainment activities, tools, concepts and brands the interviewees experience in daily life and how and why they used and interacted with them. The questions attempted to reveal their entertainment experiences, perceptions and how they interacted with their environment.

The second part aimed to extract desires and expectations of entertainment and digital life within an AV space. Ten hypothetical and future-oriented questions (i.e. *what if* you were in an empty room and had the ability to add limitless entertainment to it?, *what if* you had superpowers, and *what if* you were driving with other passengers?) were posed in which participants were asked to share their entertainment expectations. Prompting AV contexts were intended to trigger their imagination, and the underlying meanings of entertainment in an AV space were investigated.

The last part intended to reveal perspectives about entertainment by examining relationships between AVs and humans through design metaphor activities. Participants were asked to choose any cards that best represent their entertainment relationship with their car and future AV, respectively. Then, they were asked to further interpret the reasons why and how they would relate, and what the symbols in metaphors would signify in their relationship with AV. Further, they were asked to go outside of the box and introduce additional metaphors and interpret them with reasons.

3.3. Sampling

Purposeful sampling was adopted to provide relevant insights into the research question. It included selecting individuals who specifically perceived a specified phenomenon [71] and the benefits of discovering differences [72]. Participants were recruited through digital multi-channel recruitment strategies. Since the target participants were Gen Z and their increased social media usage is known [55], primarily social media platforms, online discussion forums and blogs were used. Research poster were posted in a variety of “Gen Z” and “research” relevant social media communities such as Gen Z or research Facebook groups, subreddits. Gen Z Instagram pages were asked to share the poster to invite the community. The communication was initially started in direct messages. Then, the details of the research and the participant information form were sent to the potential participants through email. Further, the research was also disseminated through word-of-mouth techniques in university student circle. Before the recruitment, full ethics approval was granted by the university.

The selection criteria were 1) age (Gen Z individuals, aged between 15 and 25), 2) willingness to participate in the research and 3) accessibility to internet and digital tools. Recruitment continued until data saturation was confirmed [72]. In the end, a total of 22 participants, consisting of 11 women, 9 men and 2 non-binary individuals, were recruited. The average age was 20 years old. The locations included the US, UK, Germany and Greece. They were either students or new graduates. It is acknowledged that the main focus of this study was not to generalise the entire cohort of Gen Z but rather to zoom in on how various members of the generation perceive entertaining experiences in an AV context. For participants who were aged below 17 (i.e 2 out of 22 participants) the consent taking procedure that has been advised through university was followed. Before conducting the activities, the consent forms were obtained to be filled by their parents or legal guardians.

The selected Gen Z age interval of the research sampling has a high proximity to the first researcher’s age. Although she is not self-claimed as Gen Z, the lifestyles and perspectives might show a shared resulting impact. Thus, it is important to share the context of the positionality due to the shared perspectives that might have been revealed in the research process.

3.4. Study procedure

The primary purpose of qualitative data collection is to add to

empirical phenomenon research [73], which is previously noted as ‘entertainment inside an AV space’ in this study. Since it is known that everyone’s reaction to conceptualisation and discussions around creative topics differs [74], creative idea generation was encouraged and new themes were welcomed during the data collection process. The interviewer’s approach allowed participants to explore topics more creatively [75], by being relaxed, friendly, colloquial and conversational.

Interviews were set up in a remote online conferencing platform. Each session was individually conducted and lasted for approximately 90 min, which included lengthy and in-depth responses. The interview procedure consisted of the aforementioned three steps that go along with the question categories. The first and second parts consisted of 10 questions and were conducted through dialogues. In the last part, metaphor cards were introduced. They were also asked to create and write about their own metaphors on the provided whiteboard. Next, participants were asked to talk about the reasons behind their own metaphors in the interview.

Notably, the role of both the interview questions and metaphors were enriching. The data from the metaphor session included a variety of analogies, which helped to reveal profound user insights. For example, participants mentioned different entertaining relationships, creating links between their entertainment experience with the car, assigning a character to the car and mentioning the reasons why their entertainment is linked with that specific relationship type. These valuable insights helped us understand where and how they position their in-car entertainment experience.

3.5. Analysis procedure

Qualitative data analysis was determined to be a suitable approach to take Gen Z’s individual experiences into account [76,77]. The raw data from the entire interview process was combined and analysed with the key question: What kind of desires, expectations and mindset would Gen Z have when entertaining themselves in an AV?

The audio recordings from the interviews were transcribed verbatim into text. An external transcription app [78] was adapted to increase efficiency. Transcripts were combined with the written data. Thematic analysis was conducted to identify patterns of themes in the interview data. It was useful to provide flexibility and accessibility, to help interpret themes backed up by data and to allow for categories to evolve from data [79].

The process followed steps such as familiarisation with data, creating initial codes, exploring themes, and defining and documenting. In total, the data produced 486 initial quotes. The analysis process was reinforced by qualitative data analysis software [80] to create efficiency during the systematic analysis of a large amount of qualitative data [81]. It was confirmed that the software was beneficial for identifying and grouping codes and clustering them to create relevant patterns out of the data. Further, to minimise the researcher’s potential bias, two coders were involved in decisions relating to the data collection method and data analysis. A digital visual collaboration workspace was implemented to assist with multiple checks in the coding process among multiple reviewers.

An inter-rater reliability check was completed by three independent reviewers to ensure the validity of the results. Each reviewer checked two different measures of intercoder reliability: the per cent agreement and Fleiss’s Kappa [82]. The checks suggested that 8 of the 10 themes could be considered reliable. Seven of them had a reliability rate over 81 % (excellent agreement) while the other one met the target minimum reliability rate of 61 % (substantial agreement).

4. Findings

During the thematic analysis of 22 interviews, 486 initial codes were generated, which were iteratively clustered into groups to extract

meaning for entertainment. In the end, 16 subthemes (S1, S2) and eight main themes were derived to frame Gen Z's mindsets of entertainment inside the car, summarised in Table 1. Table 1 shows themes in order of the frequency (F) with which they appeared in the entire responses. In addition, emotional triggers were extracted. Those helped the researcher to understand participants' emotional contexts and desires and therefore, their mindset.

• Theme 1: Effortlessness Seeking

The most frequently appearing theme was shaped around passive, fast, ready and effortless entertainment. In other words, effortlessness, ease and convenience were perceived as crucial for entertainment. An entertainment mindset that is formed around the concept of 'enjoying to be served by' reveals itself in this theme. Emotional triggers for this theme are easily accessible, fast and ready artefacts, quick and effortless content, practical solutions and an augmented level of comfort.

Convenience (S1) is concerned with the desire for fast and easy activities to entertain oneself. Some of the participants explained this:

"I want a quick bit of entertainment in the morning. I cannot be bothered to do anything else." (P11).

"I don't want to get used to a different system." (P22).

"I'm not going to waste time on trying to figure out how to turn it on how to interact with it.", and "I would like everything in the car to be the same as in my room." (P13).

Comfort (S2) is about prioritising comfort and relaxation to achieve entertainment. This is demonstrated in quotes such as:

"The form of entertainment for me is being able to relax in the car." (P22).

"I want to focus more on making myself comfortable during the ride. I would want the comfort of a parent within my car." (P6).

Further, the results from the most prominent metaphor cards corresponded with the data revealed in the interviews. For instance, the conversations around 'Butler-Client' supported *Theme 1 (Effortlessness Seeking)* by having similar intentions, fundamental values and relationship dynamics. The conversations around the metaphor frame were intertwined, revealing rich data and results that were evaluated as a whole.

• Theme 2: Sense of Belonging

Sixteen out of 22 participants expressed their need and desire for emotional connection during their entertainment experience. This need is outlined in the second theme—revealing that the entertainment experience is based on the desire for a sense of belonging. A level of

belonging is required to avoid isolation, and this forms the entertainment experience for this mindset. Emotional triggers for this theme are connecting with others, multitasking, artefacts that create an easy distraction and artefacts to create connection unceasingly.

Desire to connect (S1) brings together ideas around the relationship between entertainment and the desire to connect with one's social circle and build intimate relationships. Some participants referred to their entertainment understanding as:

"Joy of receiving messages." (P22).

"...the sense of connection is just so valuable than anything." (P21).

"We (should) have a good relationship with the vehicle. I had that connection with my previous car." (P1).

"The car is also your friend; over time you will develop an emotional bond with it." (P17).

"We (me and the car) pretty much dependent on each other. I know that's how the team works." (P7).

Addiction (S2) is associated with the desire to escape from reality, a sense of addiction and, therefore, results in fear of isolation. It is expressed as:

"The car's console is more of a bit of unwinding from reality, which is quite nice." (P17).

"I can't live without my phone. Literally. I can't." (P1).

• Theme 3: Balance Seeking

In addition to recognising Gen Z's closeness with technology, the other theme that emerged around the entertainment concept relates to their desire to balance their relationship with technology. Awareness, sensibility and mindfulness are the central notions revealed in this theme. Gen Z individuals who presented balance-seeking behaviours feel uncomfortable about their excessive digital usage and complain about digital fatigue. Emotional triggers for this theme are imbalance, unconscious usage patterns, invasiveness of digitality and simplicity.

Even though digital interactions are still part of their entertainment experience, this group is willing to take responsibility for their digital life by balancing their usage and enhancing their relationship with themselves by reducing distractions and mindless interactions. This becomes a part of their entertainment experience.

Statements such as "*I am just unconsciously spending time...but not in a good way*" (P1) and "*If you spend for a long time just scrolling unknowingly, it might cause stress or anxiety*" (P16) and "*If you compare this data integrity awareness to nowadays, I think people are now more aware of this kind of issue*" reflect the subtheme, *Awareness* (S1). Gen Z is aware of the potential pitfalls of the digital entertainment; therefore, this mindset refers to a need for balancing excessive entertainment. The emergence of these concerns while expressing views on entertainment shows that they disassociate from the standard consumption view of 'more is better'.

Moreover, the theme includes participants' *Desire to limit* (S2) their digital consumption and use, which was expressed in the following quotes:

"I want to detox myself digitally." (P8).

"I think I try to limit myself when it comes to switching either of those consoles on and I always say not to spend too long on it." (P17).

"Because then is that the car would control you rather than you controlling the car (if emotion recognition is adapted)." (P12).

• Theme 4: Authenticity Seeking

The entertainment mindset is also based on learning, discovering, exploring and gaining new skills. Emotional triggers for this theme are knowledge, environment to discover, transparency, inaccurate

Table 1

Main and subthemes for Gen Z's mindset about entertainment.

	Main Themes	F		Subthemes
1	Effortlessness Seeking	28 % n = 136	S1:S2:	Convenience Comfort
2	Sense of Belonging	19 % n = 90	S1:S2:	Desire to connect Addiction
3	Balance Seeking	16 % n = 80	S1:S2:	Awareness Desire to limit
4	Authenticity Seeking	10 % n = 47	S1:S2:	Curiosity Authenticity
5	Advocating	9 % n = 44	S1:S2:	Activism Community
6	Decision-Making	8 % n = 39	S1:S2:	Variety Hierarchy
7	Creating	7 % n = 35	S1:S2:	Creativity Self-expression
8	Interacting	3 % n = 15	S1:S2:	Interactivity Movement

information and data security concerns. The pleasure of learning is gained by a sufficient level of authenticity of the knowledge. Being genuine requires a certain degree of transparency; hence, concerns about inaccuracy might be involved. In their search for truth, real and safe interactions are valued.

Through this understanding, one of the subthemes related to the entertainment experience within this theme is *Curiosity* (S1), which was expressed in the quotes below:

“First of all, it must be informative.” (P20).

“Exploring new stuff is part of the entertainment.” (P1).

Another subtheme is *Authenticity* (S2), which is stated as “*The information that is contained has to be accurate*” (P18) and “*They are providing all kinds of information, so you have to self-filter that information.*” (P20).

• Theme 5: Advocating

Some of the Gen Z participants have engaged in entertainment by making their voices heard and actively expressing their concerns on global and local social issues. This theme is based on the idea of advocating for one’s opinions, engaging in communities, creating a bond in community culture and putting active effort into amplifying one’s voice. Emotional triggers are injustice and unethical ways of being and consuming, a space to support each other and finding shared understanding with people. A sense of social awareness and a defensive manner are significant points of the mindset. Therefore, their entertainment experience is based on the idea of activism, and their values and ideology shape it.

Activism (S1) is linked with an entertainment understanding that engages in activism, advocates for one’s voice and makes significant impacts on others. Participants expressed this as:

“(Digital is entertaining...) to advocate my word and my organisation” (P5).

“...to engage in activism, to stand for what I believe in.” (P7).

“I just want my car to be sustainable.” (P8).

“Donating to a campaign, being sustainable, using reusable or recyclable materials...I think like that kind environmental social good aspect. It really makes us connect with the brand.” (P21).

Community (S2) is associated with the desire to create a group of like-minded peers, which correlates with advocating. It is concerned with being a part of the community and creating communities in different forms to empower voices. Participants described this as:

“They are entertaining because I get a sense of community there.” (P10).

“The second thing is finding a community.” (P21).

• Theme 6: Decision-Making

Another commonly-mentioned topic in the interviews is the power of access to countless sources, platforms and media. Emotional triggers for this theme are a wide variety of open-ended and endless possibilities, the power of choosing and that space encourages freedom. For this group engaging with the desired conditions, rather than only relying on what is offered, is entertaining. Gen Z is not restricted by access to sources and opportunities. They have an extensive collection of accessible options. Therefore, they can be the leading authority through their experience, which becomes their motivation to perceive entertainment in this manner. Variety (S1) comprises the idea that entertainment is broadening its terms. For example, participant 16 demonstrated the change in the meaning of entertainment by expressing how complex and diverse it has become:

“It has been such a huge shift in what entertainment means... We’re asking so much more of entertainment now.” (P16).

Similarly, another participant stated, “*I think the more diverse an app is, honestly, the better.*” (P21).

Hierarchy (S2) is about having the power to rule the experiences, described by participants as:

“It allows control, the ability to have choices, and that’s important!” (P19),

“I think control is very important in my life.” (P19).

• Theme 7: Creating

Another frequently-mentioned dimension for entertainment was enthusiasm, the ability to create and produce, and the ability to reflect. Taking the enhancing advantages of digitality and the internet into account, Gen Z participants expressed their eagerness to take active initiative to build and create rather than solely consuming as passive customers. This refers to the form of entertainment experience where individuals are producing instead of just consuming. Emotional triggers for this theme are artefacts that inspire, the urge to create and express oneself, and changes and innovation.

Creativity (S1) emphasises the idea of entertaining by making and producing rather than consuming, as digitality facilitates opportunities to create. For example, “*People are now creating entertainment more than just consuming it.*” (P16).

Self-expression (S2) shows entertainment is made possible by digitality, which facilitates self-expression, as was expressed in the quote below:

“(in the digital world) No one is afraid to be themselves and individuality is more admired and respected.” (P21).

• Theme 8: Interacting

Interacting and performing physical activity were also shown to be common aspects of entertainment. Gen Z wanted to be involved in physical roles, move and interact, and experience entertainment. Emotional triggers for this theme are movement-initiating experiences, collaboration and interactive space. This theme was revealed through two different subthemes, *Interactivity* (S1) and *Movement* (S2). Participants expressed that a concept is entertaining because it is interactive or reflected their digital life. Further, some expressed their entertainment understanding as “*Something that will keep me up on my feet.*” (P3).

5. Discussion

This research aimed to investigate perceptions of in-car entertainment in digitally connected Gen Z individuals’ lives through a case study. The eight themes derived from this study reveal the following points that characterise AVs’ entertainment experience from the perspective of the younger generation. It suggests what to consider for future entertainment design in an AV space.

5.1. Obsessing with digital immersion

All of the identified themes indicated that the meaning of entertainment for Gen Z inside an AV is impacted by, reflected in, constructed around and deeply embodied within their digital life. One participant (p13) summed it up as “*I feel I am way too connected to the digital world. I cannot imagine my life without it*”. This reflects that it is not only that their entertainment is surrounded by digitality, but that their entertainment cannot exist separated from the digital world. This aligns with the

massive digitising of in-car entertainment [83,84,85], which is immersed and embodied within digitality. Immersive technologies have been increasingly implemented in entertainment systems in recent times [39,40,41,43].

Likewise, this study observed that a mindset that is conceptually immersed in digitality and that participants imagine the possible activities within the digital realm. For example, through digitally connecting with others in *Theme 1 (Effortlessness Seeking)*, through listening to podcasts, taking digital notes and audiobooks, learning a new language through an app in *Theme 4 (Authenticity Seeking)*, through digital activism in *Theme 5 (Advocating)*, through being provided lots of digital broadcasting options in *Theme 6 (Decision-Making)*. Even *Theme 3 (Balance Seeking)* agreed that balance could be achieved with limitations adapted to digital tools when they are on the road.

Gen Z in this study manifested the desire to take a break and unwind from reality and to be immersed in digitality and virtual realms in their in-car entertainment. It was also confirmed that the majority of participants imagined themselves engaging with the immersive technology inside the car to entertain themselves. These involved holograms, VR/AR applications, large screens, screens that surround the car's windscreen and immersive sensory experiences in the interior space of the car. This implies that emphasis should be given to designing future cars with virtual experiences where Gen Z can comfortably immerse.

5.2. Proactiveness in communities

In-car entertainment has been perceived as 'something to be consumed' such as watching and listening through connected multimedia systems or brought-in or integrated devices [35,36,37,38,41,43]. If we consider the boundaries of the existing definitions of entertainment inside a car, there seems to be a progression. This study observed that there is a tendency among participants to imagine beyond the current boundaries of in-car entertainment by connecting with countless sources and diverse platforms and experimenting with multitudinous concepts. The increasing diversity of opportunities can mean more ways to receive, convey, control and create things. Hence, the participants desire a stronger sense of agency to be more engaged in their own gamified experiences, instead of only consuming what is offered to them. This aligns with experiencing virtual worlds such as the Metaverse [86]. The themes manifest the ideas that are relevant to Gen Z's desire for proactiveness as follows: *Themes 4 (Authenticity Seeking)* by actively learning and taking the initiative to question authenticity, *5 (Advocating)* by manifesting, engaging and defending their opinions, *7 (Creating)* by initiating and expressing the self, and *8 (Interacting)* by exploring its limit of physical activity inside the car. This implies that Gen Z is likely to value proactiveness in taking action and influencing peers in a social community within an AV to be entertained.

5.3. Meaning-rich activities

Previous research has shown that in-car entertainment activities involve pursued levels of pleasure that go beyond only hedonic pleasure. The desire for pleasure is apparent when it comes to an AV context, with activities featured such as doing office work [87], social networking, managing a schedule [88], playing an instrument, doing a workout [89] or reading a book [90]. These might be associated with the eudaimonic level of pleasure [26,28], the level of emotional experience or experience of meaning [91], or the reflective level [92] when creating entertainment experiences.

Indeed, the perceptions of in-car entertainment in this study are deeply associated with the search for meaning, psychological growth and self-reflection [17,26,28]. There is a tendency for the participants to value their digital persona [86] and to express it in their in-car entertainment experience. Thus, their desires and expectation of in-car entertaining experience aligns with Gen Z's psychological need for belongingness, esteem and self-actualisation [93]. Their mindset was

demonstrated by *Theme 4 (Authenticity Seeking)*, which involves being entertained by gaining knowledge and enhancing one's intellectual level, by *Theme 7 (Creating)* as self-expression, and by *Theme 5 (Advocating)* as raising one's voice and defending one's rights to contribute to social justice. This suggests that designing a digital playground where younger generations can proactively pursue their meaning-making and value actualisation within an AV space would be worth considering.

6. Conclusion and further research

This research has explored how the meaning of in-car entertainment might differ within the minds of Generation Z compared to others. Eight different mindsets were revealed, which led us to summarise three points that characterise AV's in-car entertainment experience. Gen Z has shown different desires for in-car entertaining experiences compared to the typical parameters of the current entertainment. This study provides a perspective, that can be taken as a starting point to emphasise and discuss the changing needs and desires required for a broader concept of in-car entertainment in the future. Further, this knowledge can be used as a guideline for designing meaning-rich in-car entertaining artefacts and digital experiences that reflect Gen Z's potential economic activity.

In future research, conducting similar studies with larger and different generations (i.e., X, Y and Alpha) would be helpful to enrich the knowledge of in-car entertainment experiences.

It is acknowledged that virtual research due to COVID-19 restrictions and the innate limitations of qualitative research were inevitable in the process of sampling, data collection and data analysis.

Data Availability Statement

Due to the commercial nature of this research, it was agreed that the data from this research would not be shared publicly. Hence, supporting data is not available.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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