Juicy Audio: Audio Designers' Conceptualization of the Term in Video Games

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While juiciness in games has previously been explored in the context of visual embellishments, less is known about whether and how the concept is leveraged in the context of audio and sound design. In our work, we address this issue through in-depth interviews with twelve audio designers working in the games industry. Through thematic analysis and content analysis, we show that principles of juicy design also apply to audio and sound design, and that it is applied intentionally to improve player feedback and experience. On this basis, our work contributes a conceptual foundation for juicy audio in its key factors of emphasis/augmentation, cohesion/coherence, and synesthesia. We identify associated attributes and provide implications for the design of games that seek to leverage juicy audio as a means of improving player experience.

CCS Concepts: • **Human-centered computing** → **Auditory feedback**; **Empirical studies in HCI**.

Additional Key Words and Phrases: juicy, audio, sound design, concept analysis, expert interviews, game industry

1 Introduction

Juiciness is a term well-known in the games industry. It describes a player experience that contains a coherent design of game mechanics and visuals. The game provides direct, relevant, and explicit feedback to the player but also offers superfluous feedback that informs players about the game state and contributes to the game's coherent feel. Despite its origins in the games industry, the term has attracted significant attention from researchers [19–22, 24, 25, 44]. However, most research has primarily focused on the visual aspects of juiciness or the overall player experience. This leaves a considerable research gap for the exploration of juiciness in the context of game audio. Audio plays a significant role in games, affecting player emotions and overall immersion [16, 17, 42]. Yet many questions remain surrounding effects of audio design in game contexts. Investigating the concept of juiciness in audio holds the potential to discover a better understanding of game design and player experience.

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This paper investigates the concept of juicy audio. Juicy audio is a term with fuzzy definitions. Understanding the nuances of juicy audio holds substantial value for both the game design field and our existing understanding of player experience. Our ability to dissect how sound design contributes to the sensation of "juiciness," lets us gain systems to craft more immersive and satisfying gameplay interactions. Our research has the potential to unlock new design principles for enhancing player engagement, informing feedback mechanisms that improve player responsiveness, and for shaping the emotional impact of games. Moreover, exploring juicy audio from the perspective of industry professionals offers a unique window into the creative practices and techniques that shape the sonic landscape of modern games. Our investigation is thus a qualitative exploration of professional sound design practices.

The primary objective of our work is to understand how audio practitioners conceptualise and apply the ideas of juiciness in audio design. Our study examines both the conceptual application of how audio designers interpret and implement juiciness, and a lexical understanding of how professionals understand and use the term juiciness in audio contexts. By addressing both the application and terminology of juiciness, we aim to capture the depth and breadth of juiciness in audio design, contributing to a more comprehensive understanding of its role in enhancing player experience.

To achieve this, we conducted in-depth interviews with professional sound audio designers who have industry experience (n=12), yielding over eight hours of recorded interview data. Our analysis uses a unique hybrid method combining thematic and content analysis, providing a robust framework for concept analysis.

We began our study by establishing a baseline understanding of *juicy audio* within the professional sphere in which our participants work. We examined the interviews to identify recurring themes and definitions. This revealed areas of conceptual consensus among our experts. Next, we investigated possible differences in how professional interpreted and applied the term. This allowed us to shine a light on the many-sided and context-dependent nature of juicy audio. To connect theoretical constructs with real-world implementations, we extracted and analyzed specific examples of successful juicy audio design cited by our participants. These concrete instances offered insights into the practical application of the concept.

Our resulting insights from the interviews deliver several key contributions:

(1) **We identify shared views on what "juicy audio" means**. We wanted to establish a baseline understanding of this concept within the professional context. These shared views highlight core elements that experts largely agree upon: emphasis/augmentation, cohesion/coherence, and synesthesia. It provides a foundation for further analysis and potential standardization of the term.

(2) **We point out differences in how it is defined.** Audio designers have different conceptual boundaries for related and competing concepts. Examples include punchy or satisfying. Some view these as synonymous with juicy audio. Others see them as required but non-exhaustive factors. Yet, others view them as common but not overlapping. These differences reveal the nuances, complexities, and subjectivity of juicy audio. They demonstrate the potential for varied interpretations and applications, which can inform more inclusive design practices.

(3) **We give specific examples of juicy audio and synonyms for the term used in industry**. These include descriptions of emotional scenes and real-life situations. Others help us ground the concept in real-world trademark sounds of games like Doom, Dark Souls, or Bloodborne. Juicy synonyms, such as crunchy, meaty, or spicy, help us expand the vocabulary around juicy audio. Our study thus bridges the gap between theory and practice.

This work holds substantial implications for both researchers and game industry practitioners. Developing a deeper understanding of juicy audio allows us to pave the way for the design of more effective feedback mechanisms, heightened game emphasis, and ultimately, enhanced player satisfaction and engagement. Our research offers a new perspective on the familiar concept of juiciness. It enriches the ongoing discussions on game design and player experience.

2 Background

2.1 Juicy Design: The Conventional (Visual) Concept

In recent years, the term juiciness has become a prevalent concept within the gaming industry [52], serving as a designer shorthand for the incorporation of abundant positive feedback mechanisms within a game [23]. This terminology has gained traction predominantly through discussions at industry-centric venues where game developers have dissected and discussed its utility and implications [34]. The concept of juiciness has become a focal point in post-mortems and online tutorials for game developers, indicating a growing interest and emphasis on this aspect of game design [18].

The discourse surrounding "juiciness" in the industry often underscores its role in fostering a polished aesthetic within a game [23]. Developers have been known to provide explicit lists of elements that can be integrated into a game to enhance its juiciness [32, 35]. However, it is noteworthy that these suggestions are generally confined to specific game types or genres [30] such as *"making your bullets bigger and faster"*, advice which is only applicable to a specific genre. Furthermore, these discussions have led to a consensus that the incorporation of "juiciness" contributes to the creation of games that offer a "great feeling" to players, enhancing the overall gaming experience [23].

Despite the growing emphasis on juiciness, the industry discourse still lacks clarity on how to implement this concept in a tangible manner. The term has been described as "adding weight to player actions" [34], which is frequently used in these discussions, but remains somewhat ambiguous, leaving room for interpretation with respect to its actual meaning and implications. In industry articles, game developers have adopted words like punchy and crunchy [23] which are frequently used in the same manner as juicy, however it is unclear how the words relate or differ from each other. While there is substantial conversation surrounding the technical details of implementation, such as the addition of screen shake and bass-heavy sounds [23, 52], there is a conspicuous absence of discussion on the universality and potential impact of these components.

2.2 Academic Exploration of Juiciness

The gap in industry discourse has begun to be addressed by academics looking to understand the broader impact and significance of this phenomenon on player experience. There have been a handful of academic explorations of juiciness in a number of different contexts. Juul and Begy [24] presented one of the first forays into empirically understanding the impact of juiciness through evaluating the juicy embellishments in a puzzle game, finding that juiciness was perceived as important to the players but had no impact on the measured constructs of experience such as ease of use. Hicks et al. [19] interviewed game designers on their usage of juiciness in a design context, using the results to present a grounded definition of the term highlighting that juiciness from a designers perspective extends to more than just visual feedback but considers the coherence of the game mechanics and providing feedback on multiple sensory layers. Hicks et al. [20] further explored the importance of multimodal juicy elements in a study that compared and combined juiciness with gamification elements. Results revealed that combined visual and auditory juicy elements led to a better game experience than a base condition with neither juicy or gamification

elements, but an equal experience to the gamified version. When both juiciness and gamification were combined, it correlated with a slight improvement in experience.

More recently, academics have studied juiciness in specific contexts. Kao [25] explored the effects of juicy feedback elements in an RPG game, finding that both extremes of juiciness (none and too much) have a negative impact on the experience, total play time, and player performance. Medium and high amounts of juiciness led to increased intrinsic motivation, play time, and better experience. The finding that juiciness can impact performance is interesting as it contradicts the existing literature to some extent which has previously found juiciness to not impact performance [20, 21]. Additionally, Hicks et al. [21] explored juiciness from the lens of self-determination theory [43, 49] across several genres (action, arcade, and first-person shooter), finding that juiciness has a similar impact across these game types: it increased some aspects of player experience such as meaning and curiosity, but did not impact performance or player behaviour. Work by Johansen et al. [22] has explored how to best implement juiciness into the development process, creating Squeezer—a development tool for use with the Unity engine—through a small user study with experts. They found that designers were intrigued by the usage of such a tool and how it could inform the design process. Singhal and Schneider [44] looked at a more specific case of juiciness through vibrotactile embellishments in the context of mobile games focusing on the haptic feedback channel. They found that juicy haptic embellishments have the potential to enhance the experience in several ways such as perceived enjoyment, aesthetics and immersion.

2.2.1 Juicy Design in Game Audio. The auditory manifestation of juicy design in games remains under explored. While the juicy framework by Hicks et al. [19] references multiple communication channels or modalities (visual, haptic, and audio), it does not discuss what makes audio (or haptic) feedback juicy. It has been part of prior studies looking at combined audiovisual juicy design [21, 24, 25, 44], which leaves open questions about the impact of the auditory aspects specifically. A single prior study by Smets and van der Spek [45] has empirically explored juicy audio. They created eight sound effects as non-juicy audio versions, and from this basis developed juicy audio versions through distortion, higher or lower pitch, added reverb, chorus or delay, layered sounds, longer duration or additional sound effects. They compared effects on player experience in a custom side-scrolling shooter game. Participants (n=61) in the between-participants mixed-methods study experienced significantly greater immersion and sensory fidelity (medium effect size). However, the theoretical basis for designing juicy audio in this way is thinly connected to theory, and it is possible that the effect was elicited by the greater presence and duration of sound effects, rather than by an increase in juiciness specifically.

2.2.2 Game Feel. Residing above the element of juiciness is the broader topic of game feel, which much like juiciness has been explored by some academics but still remains a fairly intangible concept. Pichlmair and Johansen [38] conducted a detailed literature review of how game feel has been discussed across academia and industry across just over 200 sources, categorising insights into three main domains of player experience: physicality, amplification, and support. These domains are enhanced by polishing techniques like tuning, juicing, and streamlining. In the context of this work, they define juiciness as an act of *"polishing and amplification"*, resulting in empowerment and enhanced clarity of feedback. Fasterholdt et al. [13] have dived deeper into very specific aspects of game feel, analysing how jumps are constructed in platformer games using the lens of game feel, breaking down good feeling jumps into 21 features and concluding that each specific game tweaks these features to create good feeling platforming. Lin et al. [31] explore the design elements that affect the sense of impact in action games, a concept they term *"impact feel"* Through a data-driven approach, they collected player comments from top selling games, trained a natural language processing model, and analysed games using a framework related to impact feedback design. Their

findings highlight the significance of hit stop, sound coherence, and camera control in enhancing players' sensory experience of impact. Dahl and Kraus [10] investigated game feel in the context of how avatar acceleration and deceleration affects players' perceptions of control in a platformer. They found that player descriptions of game feel varied, using terms like 'heavy,' 'slow,' 'responsive,' and 'realistic, ' but that they understood the importance of a game feeling good.

There is a small but growing body of academic work in this area of understanding juiciness, however, it is still relatively under explored. The current discourse presents a timely case for drawing conclusions on how juiciness is conceptualized and constructed, particularly from the perspective of industry designers deeply familiar with audio and sound design. Our work seeks to address this gap: Through empirical investigation, we seek to provide a clearer understanding of what makes sound design juicy. Thereby, we want to provide a systematic foundation for designing and validating juicy audio for academics and industry designers alike, while also discussing pathways for evaluating the impact it can have on player experience and player performance.

3 Method

To explore how audio design practitioners understand juicy audio, we conducted an interview study with N=12 professional audio designers. We asked our participants to describe their approach towards designing sound effects, their experience with and understanding of the term "juicy" in audio design in order to elicit concrete implications for design.

3.1 Procedure

We recruited participants online via Twitter as well as word of mouth and direct exchange with known industry contacts (e.g., within the Audio Engineering Society[1]). Recruitment was phrased as exploring audio designer's perspectives on sound effects generally, without mention of juicy audio, to avoid priming participants or biasing the participant pool. As the audio design practitioners are predominantly male (e.g., more than 75% in the UK[2]), the social media recruitment post explicitly encouraged women and non-binary audio designers to participate to recruit a balanced set of perspectives. A screening process (making sure participants had industry experience in an audio role in games or interactive media) and post-interview remuneration (a 10 CAD[3] Amazon voucher) was carried out via UserInterviews[4]. Participants were recruited for 30-min interviews, held via Zoom calls. Most of these interviews ran over and developed into longer conversations; in these cases, we asked participants for consent to continue. On average, the interviews lasted ~39 min (*IQR*: 36−45 min), yielding a total of 8 hours and 10 minutes of audio-recorded data with our 12 participants.

The semi-structured interviews first asked about participants' industry experience in audio design (including years of experience, team size, game genres and types of audio), and then consisted of three blocks: asking how they approach the design of sound effects for feedback, whether they have come across the term "juicy" in the context of audio design, and how they consider sound effects for feedback to affect player experience. If participants were unaware of the term juicy or were unsure on aspects, we provided a definition taken from [19], see Appendix B for the full definition. The interview ended with asking participants to describe their demographic background (age, gender, countries of residence and working experience, and playing habits). The full set of is questions provided in Appendix B, but generally led to a free-flowing conversation in which we followed up on and asked for clarifications about the participants' responses.

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[1]https://aes2.org/
[2]https://ukie.org.uk/resources/uk-games-industry-census-2021
[3]Or equivalent in another currency.
[4]https://www.userinterviews.com/

Table 1. Demographic overview of the interviewed audio designers. Gender: male (m), woman (w), non-binary (nb). Countries of residence and working experience reported as ISO 3166 alpha-2 code.

Participant	Experience	Gender	Age	Country	Working Experience
P1	SFX, music, audio programming; mainly AAA with small mobile games as side hustle	m	38	DE	DE, GB
P2	music degree, audio middleware software, sound design, film school, freelance in film & video games (AAA & indie)	m	32	GB	IT, CA, GB
P3	indie educational games, now AAA user research department	w	28	CA	CA
P4	music and sound design, freelance indie games, game jams	nb w	27	US	US (int'l clients e.g., JP, HK)
P5	music industry, movie audio, video game audio, 100+ commercial games (indie, AAA)	m	33	FI	FI
P6	sound engineering, classical music recording & editing, binaural music & audio, VR audio, sound design, small teams	w	24	DE	DE
P7	music degree, audio freelance, sound design & music, indie games, one non-game audio project	w	25	NO	NO
P8	audio dramas, podcasts, indie, now 4 years AAA	m	27	GB	GB
P9	music degree, game music and sound design freelance (indie, AAA), part-time non-game recording engineer	w	25	DE	DE (int'l clients: CH, US)
P10	audio production & record label owner, music, sound design, and voice recording, VR audio, now recently: AAA games company (decade in non-game audio design)	w	31	GB	GB
P11	music production, game audio incubation program, music and sound design, 8 years at mid-sized game company, now: own game audio startup	w	32	SG	SG, HK, CA (int'l clients e.g., MY, TW)
P12	AAA games company (3 years), now smaller company, full-time mostly AAA, but side projects and freelancing also with non-AAA	m	26	GB	GB

3.2 Participants

Twelve audio designers participated (5 men, 6 women, one non-binary woman); nine of them were resident in a European country, two in North America, and one in Asia. Five of them had working experience in other countries and/or international clients. On average, they were 29 years old (min=24; max=38; *SD*=4.2) and had multiple years of industry experience in game audio as employees or freelancers (or both). In their capacity as sound designers (and sometimes also composers), participants have worked on games ranging from smaller indie games (not named here to uphold anonymization) to larger AAA ones (named in aggregate to uphold anonymization; e.g., Star Citizen [7], Rainbow Six Siege [50], Elite Dangerous [15]). Seven of the participants interviewed had prior knowledge of juicy as a design term in the context of games. Their combined experience covers a highly diverse set of platforms (mobile, PC, console, and VR games) and game genres (including shooters, action/adventure games, point and click, role-playing games, puzzle games, dating simulators, educational games, museum exhibit games, business and space flight simulation, and platformers).

3.3 Analysis

The interviews were transcribed automatically, and subsequently corrected (where needed) and coded in Dovetail[5]. We applied a combined hybrid (deductive and inductive) thematic analysis [14] and content analysis [51] approach, as a qualitative approach to exploratory concept analysis is recommended when the concept is still poorly understood (*"for concept identification, development, delineation, and correction"* [33]). As presented in Figure 1, we began with the hybrid thematic analysis. One researcher (light blue in Figure 1) conducted a deductive thematic analysis using a codebook consisting of the juicy framework by Hicks et al. [19]. Simultaneously, a second researcher (dark blue in Figure 1) conducted an inductive thematic analysis using both semantic and latent codes. The deductive thematic analysis primarily served to find out whether the elements of juicy design found in prior work also apply to the auditory modality. The codes developed in the inductive thematic analysis were iterated on and clustered into categories using affinity mapping on a virtual board, and then discussed by both researchers in iterative (re-)review of the transcripts to develop themes both about the process and infrastructure of the sound design industry, attributes of audio in general, and then juicy audio specifically. Our thematic analysis method can be classified as following a *codebook* [6, Ch.8] or *template analysis* approach [27]; thus for this project we viewed and constructed themes as topic summaries.

The content analysis (conducted by both researchers; yellow in Figure 1) was focused on sentences that provided *definitions*, *examples*, and *synonyms* of and for juicy audio. These were marked during the initial coding of the thematic analysis and were subsequently extracted for the content analysis. Both researchers separately interpreted the extracted definitions to draft summaries of each participant's understanding of juicy audio. These were then extensively discussed, cross-checked with the examples and synonyms provided by the participant, and adjusted to create the final summaries to reflect each participant's understanding of juicy audio (presented in Table 4). The summaries were then used for a second step of the content analysis to code participants' reported recurring attributes of juicy audio. These attributes were then categorized using affinity mapping into three broad categories: *purpose and perception* of juicy audio, its *technical attributes*, and the *context* in which it occurs and is used. The attributes along with their categories are presented in Table 2.

4 Findings

This section provides an overview of the findings, beginning with results of the hybrid thematic analysis and followed by those of the content analysis.

4.1 Deductive Thematic Analysis: Applying the Juicy Framework

The interview data demonstrated a varied emphasis on different aspects of the juicy framework [19]. **Thematic Coherence**, **Gameplay Coherence**, and **Feedback Coherence** are the most represented codes (reflecting a 12%, 11%, and 10% presence in the data, respectively). These codes were applied when the transcripts suggested a significant focus lies on ensuring that audio feedback is in line with the game's theme, mechanics, and player actions. **Exaggerated Feedback** and **Relevant Information** are also prominent, each accounting for 10% of the codes, indicating a preference for audio that enhances the gameplay experience and provides meaningful information to the player. **Expected Mechanical Action** and **Multimodal** aspects, representing 9% and 7%, show a moderate presence, highlighting the importance of predictable audio responses to player actions and the use of multiple sensory modalities.

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[5]https://dovetail.com/

step 1: hybrid thematic analysis   step 2: extraction   step 3: individual interpretation & summarization   step 4: discussion, merge, cross-check   step 5: identification of "juicy audio" attributes
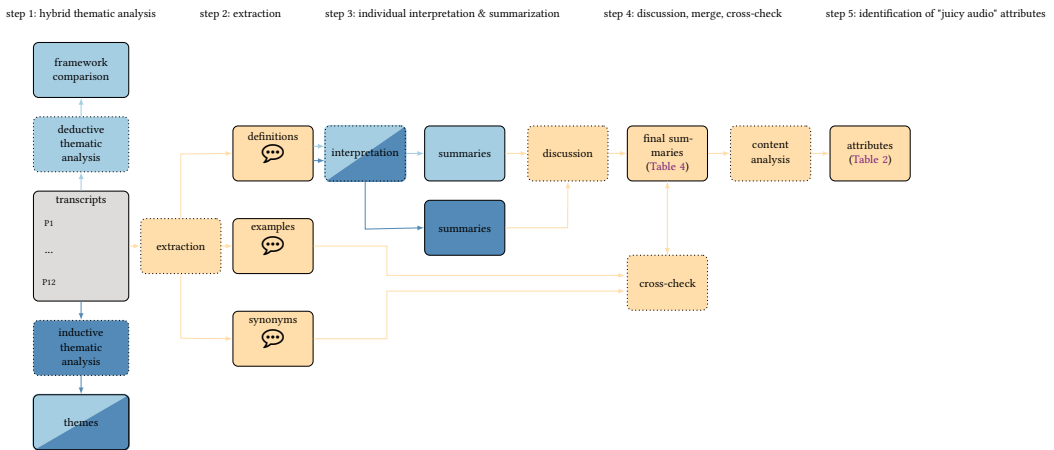

Fig. 1. A combined hybrid thematic analysis and content analysis approach was used to analyze the interview transcripts. Blue shapes present aspects done separately by each of the two coding researchers (one coder represented by light blue, the other by dark blue), while yellow shapes were conducted by both researchers together. Dashed lines represent an activity (e.g., an analysis step) while solid lines represent an outcome (e.g., extracted definitions).

Lesser emphasis was found on **Focus of Attention**, **Highlighting**, **Confirmatory Feedback**, and **Unambiguous Feedback**, each constituting around 5-6% of the codes. Ambient Feedback and Supplementary Feedback are the least represented in the analysis, with only 2% and 5%.

The analysis also uncovered aspects of juiciness that extend beyond the juicy framework, such as considerations around accessibility, user interface feedback, specific sound elements, and the concept of feedback diegesis. Overall, while all areas of the framework were represented in the data, the extent of their representation varied.

4.2 Inductive Thematic Analysis

Beyond insights into our participants' understanding of juicy audio, the themes developed through the inductive thematic analysis also captured more general insight into processes and characteristics of the audio industry in games and other media. We discuss the latter first, to provide a foundation for the context in which juicy audio is created and our specific participants' experience in the industry. Themes (the developed overarching categories) are highlighted in bold font. To improve ease of reading, we include selected key quotes while reporting the findings.

Audio Industry Practice, Audio Characteristics and the Impact of Interactivity. Participants discussed processes and characteristics of **audio industry practice**. The participants emphasized there is no fixed process for audio design. Over their career, most engaged in multiple aspects of it: capturing audio or Foley work, curating or re-purposing existing audio, as well as audio balancing, programming, and post-processing. In games, especially in smaller teams, developers and designers often provide input and add to discussions around audio design. Many reported that audio design occurs under constraints, such as scaling issues, limitations of players' headphones and speakers, or even data size concerns. Participants referred to existing sound examples and used rich descriptions to communicate characteristics of specific sound effects. Noticeably, many of them used sound mimicry to supplement this by accurately mimicking existing sound effects or convey hypothetical ones. Participants also discussed **general characteristics of audio**: Participants often highlighted

that audio and sound is subjective and not generalizable, relying on the experience and intuition of the audio designers. Despite sound being subjective, the participants were comfortable classifying its **goodness**, i.e., "good" and "bad" sound design. Commonly they emphasized aspects of its effect and purpose in the context of **user experience**: sound design to elicit specific emotions, to support immersion, and its dual role in carrying both aesthetics and function. Several participants also held experience in audio design outside the context of games audio. These also reported that audio design is affected strongly by **interactivity**, as designers have to yield control over the created audio to the players' agency in navigating their experience of it. Similarly, some mentioned the need to consider the **mute-ableness of sound**, as this is up to player choice.

How Sound Designers Communicate Sound. The interviews revealed a lot about **sound design communication**. It was very noticeable that the audio designers were quick to use (and skilled at) vocal mimicry (or vocal sketching, see [12]; or vocal imitation, see [4]) to communicate specific sound examples, such as in the tentacle example further below (for theme synesthesia), or: *"So apart from having a very hard attack, I will always prepend it with a whoosh, because if you add a whoosh in front of an impact, it will make the impact more impactful than it is in isolation. So like the way I think about it is like a whoosh then maybe like a soft dip in silence after the whoosh and followed by the impact. So it's like, <mimics sound>"* (P11). This was described as a successful way of vocal sketching or prototyping: *"I have stopped being shy about that. Cause it's, it's hard to describe sounds [...] so that you just have to like rebuild what you will have already, like prototyped, it's like a sketch [...] something that you can just create with your mouth first"* (P09).

Specific sound examples (from existing games and other media) were also important for communication: our participants often described sounds in reference to such examples, and they reported this as a common method of communicating sound design with clients and co-workers: *"they just provide the sound. They give it to us and say, we want your sound to sound something like that"* (P11). The same participant also described developing an audio design document to position such references: *"I come up with a palette, like a sort of like game audio design document [...] that kind of conveys to everyone on the team what kind of audio direction we're going for. So I usually have like a two axes, X and Y axis, or is it a serious, is it going to be cute? Is it going to be mostly organic sounds? Is it going to be synthesized sounds? And then with these axes, I can start plotting my references"* (P11). In some cases, specific examples also involved picture references: *"he told me [...] 'I would make a sound that kind of looks more this way.' And he sent me a picture [...] of this kind of like blue lens flare. So something very abstract, but it kind of conveyed the sonic information really well. So the lens flare itself had like some colors and some kind of a train. So you could kind of see from the lens flare itself, some kind of envelope that you needed to follow when designing the sound"* (P12).

Otherwise, sound designers commonly use visual descriptions based on metaphors: *"usually words borrowed from other senses [...] like a bright sound or, or I dunno, tactile sound, something like that. So I think speaking in metaphors is, is a very, it's very useful. "* (P02). This also sometimes involves the use of colours: *"people have said things like make a sound more purple"* (P12). However, this also did not always work well: *"you might get someone to say like, 'Oh, it sounds a bit too, like blue, can you make it a bit more brown.' And it's like, that doesn't mean anything to me when it - it's audio."* (P07).

Conceptualization of Juicy Audio. Eight participants (66%) expressed that they had come across the term before. Many expressed some uncertainty about what the term might mean definitively, even as they were describing aspects of the concept, e.g., *"I can imagine what it is"* (P09). In particular, there was some overlap or confusion about whether juicy is just another term for sound that is particularly well liked or enjoyable: *"But doesn't actually mean anything except for that I really like it. And maybe there's like a lot of like, there's a lot of uniqueness and pizzazz to it that I think is really*

special, but I don't fucking know what the hell juicy might mean in sound design" (P04). In describing juicy audio, some answered promptly with a clear idea, but most of them thought it through on the spot, and thus their reported descriptions can also hold inconsistencies. Nevertheless, there were distinctive recurring patterns in the transcripts that we identified and constructed as themes.

We distinguish these mainly as *attributes* of juicy audio, and the *effect* it has on players or—in complementary view—the *purpose* with which it is employed by audio designers. One very common attribute of juicy audio referred to its **connection with coherence/cohesion/expectations**. Juicy audio doesn't work with all aesthetics for some participants: *"if it doesn't fit like the game aesthetic to, for a sound to be juicy, then it shouldn't be so"* (P09). When a sound is designed to be juicy it has to be coherent in itself: *"that was pretty much just all about the layers and getting the right frequencies together."* (P07). Even more so, juicy audio fits the actions in the game that it is paired with: *"the sounds and the actions you can do just, just really fit together. It's - I cannot imagine them to sound differently [...] overall the composition of the game"* (P06); and *"a matter of like the context of like, [...] does it fit?"* (P04). However it is possible that part of this relates from general goals in creating "good" audio rather than creating good juicy audio: *"[What [...] would make a bad juicy sound effect?] Anything that confused someone [...] if you're walking on like solid floor and your character makes like sound that would be in mud, that confuses you. So it just doesn't match like your, what do you call that? It's like [...] mental model [...] you think you're one place, but like your senses confirm that you're not in that place and sound is one of those."* (P03).

Another attribute referred to strongly was **synesthesia**: juicy sounds tended to be described in the context of other sense, for example outright describing it as *"tactile"* or *"more textural"* (P11) or *"it kind of feels a bit more physical and visceral"* (P05). Others used very tactile descriptives like *"thickness [...] a bit of wetness"* (P04), *"gritty"* (P07), *"texture where you start kind of having some sensation "* (P09), or *"involve some kind of fluid, kind of slime"* (P11), or even: *"Like when he attacks, like [mimics sound], just make that like [mimics sound], when it smacks. That's like [mimics sound], just add - look at the tentacle go, bring up all the slime and like [mimics sound] innards of the tentacles just [mimics sound] smacking and like [mimics sound] throwing slime all around."* (P05).

Juicy audio was also described in **connection with enjoyment and satisfaction**: it is sounds with *"a bit of fun injected into it"* (P11), that are *"making the player feel good"* (P05). Satisfaction was referenced often by many participants, e.g., *"it equals to satisfying"* (P11), *"it's very satisfying"* (P07), *"Juicy is quite satisfying"* (P02). One participant viewed this as a necessary attribute yet also stated that sounds can be satisfying without being juicy: *"not all satisfying sounds have to be juicy, but juicy sounds have to be satisfying"* (P09).

Other attributes portrayed juicy audio as abstract or less realistic (**connection with unrealism**): *"realistic physical audio systems [...] which is the opposite of juicy."* (P02). Comparisons were made with cartoon or anime sound effects, connecting with the purpose of feedback: *"it doesn't sound like this in real life, but it's confirms what you're seeing "* (P03), and *"doing things [...] in a less natural and much more abstract way, feels like it can very often be a lot more rewarding because real life isn't rewarding and it's basic and it's boring."* (P08). However this attribute was also described as requiring selective application: *"it's a bit of a [...] temporary stretch when you hear a juicy sound, a temporary stress from realism, but that needs to go back to realism immediately afterwards."* (P02).

A few participants (largely those with music composition experience) also described juicy audio as having a musical, harmonic quality, both inherently and in the context of the rest of the game audio (**musicality**), e.g., *"sometimes the sound effect, right. It's tonal, like it has melody or melodic elements in it, and it just falls in tune with the background music. And that feels really cool."* (P11).

A conflicting factor was also mentioned in **mediation/diegesis**, i.e., the need for audio to be subtle and non-distracting, which is in contrast with the common application of juicy audio for emphasis: *"there is a threshold even for juicy [...] juicy sounds, they do take a lot of your attention and*

that's part of why they are juicy sounding it's that they are attention grabbing and, or, and if there's too much of it or if it's done and kind of the wrong way, it can be too much, definitely [...] it can get a bit overwhelming" (P07). Overdoing it makes for a bad experience: *"You can over juice as well"* (P05).

Given these attributes, it is perhaps unsurprising that juicy audio was described strongly as being applied for the purpose of **emphasis/augmentation**. One way was to view it as decorative embellishment, e.g., *"Just like accentuates things like that. a bit like drawing, like comics [...] make the actions more extra exaggerated [...] make sure that you accentuate the action, make it ridiculous. And you can always tone down from there. But if you start with ridiculous, it'll probably end up at state as ridiculous because it feels good."* (P05), and *"I would see like unnecessary frills as part of juiciness as well [...] anything enhancing or decorative [...] it has a lot of frills [...] it's not necessary, but it improves the, the senses with it"* (P03). In other participants it was enhancement in the form of multimodal information about events or actions: *"that's juicy because it reinforces the movement"* (P08). Most commonly, it was described as a way of emphasizing big, important moments: *"we try to save that for the special moments,"* (P12), for example *"a difficult moment for the player, the player succeeds in, in overcoming the difficult moment"* (P02) or *"the sounds for some specific weapons that are mounted that are the largest weapon mounted on the largest ship that you encounter once every two months in the game, something like that. And so we reserved the juiciness for those specific sounds."* (P02).

The trade-off of this usage of juicy audio is that designers have to be careful not to overdo it: *"juiciness loses its juiciness if it's repeated too often [...] you have to create these moments where the juiciness can really shine"* (P09). Through being used sparingly, this also helps shape its rewarding effect: *"It's like having that punching exciting thing only works [...] if it's like a significant moment [...] it's not like that constantly. [...] there's a chance to rest, a chance for quiet, you know, and then you have that big moment. That's what I think makes it feel big and rewarding and exciting."* (P12).

This is closely related to juicy audio for the purpose of **feedback** (which even outside of juicy audio is a crucial role for audio in games), e.g., *"if it's something that's meant for feedback, right. It has to bring out something very primal in the player, right. The primal satisfaction, like you don't have to use so much brain they just feel it [...] the sounds are so juicy, right, it makes people feel really satisfied. And that, that like, you know, when they get, when they win or when they do a good move, that feedback is extremely positive."* (P11). One participant described juicy audio in the context of gamification with this purpose: *" like with gamification, it's like, like when you complete a level of Duolingo, there's going to be like a <mimics sound> congratulations. Like that's something that is, it enhances it because it makes you feel good [...] So that's something I see as a juicy sound effect."* (P03). Related to this, audio designers use sound design for feedback (in general) for **communication with the player**, e.g., by **communicating character** (e.g., conveying the avatar's health status through their breathing; creating a distinct set of character sounds; supporting avatar identification by connecting to player actions), **communicating objects** (e.g., the weight of the player's inventory, or the damage a specific weapon will do), **communicating mechanics** (e.g., notification of upcoming attacks or warnings that an object will disappear) and **communicating story** (e.g., styling user interface sounds after the effects they have in the game world; environmental sounds; sounds that convey pacing). When discussing juicy audio specifically for communicating with the player, the audio designers largely referenced its use in the context of player attention: This involved capturing attention: *"trailers are a very good example of juiciness, also like advertisements are oftentimes trying to yeah, to have that very juicy, very impactful, very thick, sound design, which is probably, I think part of why it's done in advertisements is because you want to stick out from other advertisements and through being loud. And I think the more like a sound covers the whole frequency spectrum, the more loud it will sound as well or the more it will stand out. So that's very helpful for creating attention for viewers"* (P09); but also involved guiding attention: *"if it's an action you want the player to do it's it's it has to sound kind of nice and rewarding. So the player does actually do [...], what [they're]*

supposed to do. Also the opposite. So like, if, if they can, I don't know, jump down great heights, but then the character gets hurt, then it has to sound like the character gets hurt so the player doesn't do it." (P06). Three audio designers also framed juicy sounds as being used to support effects of **branding/recognition**, i.e., creating sounds that are instantly recognizable to players: *"you hear just a fraction of it or it's in some way in the background and you immediately know, Oh, I know that weapon and know what's going to happen when someone's pointing a weapon at me"* (P06).

Finally, usage of juicy audio is referred to in the context of **fatigue/novelty**: In interactive media especially, repeated sound effects can quickly lead to fatigue. Juicy audio can supply novelty to a soundscape: *"It sounds, it also has an element of almost surprised, like a new sound that maybe you're not familiar with, or you never heard in terms of frequency range. "* (P02). Put in context of the emphasis/augmentation purpose, providing variations of sounds and avoiding their repetition is particularly important for juicy audio: *"the sound in isolation can be crunchy and punchy, but you listen to two hours of it. It's just, you just lose it."* (P11). Similarly important, however, is the arrangement of specific juicy sounds within a game's overall soundscape: *"so you have to make sure that those sounds are [...] that it's mixed well enough and it's not going to make you lose your mind from repetitiveness. Certain sounds are [...] allowed to be more unique depending on the frequency of it, but it doesn't matter if like - you can't make every single sound, the coolest freaking thing ever. You have to make sure that there's no ear fatigue"* (P04).

Technical Shape of Juicy Audio. The designers often described audio in terms of its technical "shape" (or the "envelope"). Dissonance and harmonies in the envelope can be used to create tension-and-relief arcs, e.g., *"There could be like a [...] dissonance thing that there's like, things that objectively sound out of tune or bad or a little bit like, [...] friction in the sound, [... then] letting go of that tension and creating harmony, that would be like a moment of relief"* (P09). Alternatively, frequencies can be filtered and built-up: *"it could be a filter [...] you could either like cut off the low frequencies, so that it's - the song sounds like too thin almost. And then if you open up the filter again and the whole frequency spectrum opens up again, that's a satisfying moment [...] the filter opening led up to that point of release and relief"* (P09).

The **technical shape of juicy audio**, specifically, was most commonly described as featuring a full frequency spectrum and heavy use of bass, and sometimes with attention paid to curve-down or trail of the envelope. A full frequency spectrum implies coverage of the whole frequency range, e.g., *"I put a big emphasis on shape and cadence in the sound effects that imply that juiciness [...] you could do a really elaborate multi-cadence kind of much longer, much fuller frequency, much more impactful [...] that allows you to kind of really beef up that kind of juiciness [..] it has [...] to be usually quite full in the frequency range."* (P08), and *"I'm picturing a sound with quite a broad band frequency range. So not just low end, not just high end, a bit more of a spectrum."* (P02). It was also described as creating *"very juicy, very impactful, very thick sound design"* (P09). While covering the full spectrum of frequencies, sound designers who described the technical shape put an emphasis on the bass (i.e., the low end of the frequency spectrum): *"the first thing I think when I, when you say you need to design juicy sound is a base, like I think most, most sounds I would consider juicy have quite a bit of bass [...] there needs to be bass because bass is a satisfying, it's got, it goes beyond the hearing, it's more of a physical response. When you hear bass, like this very low, low wave. Sometimes you get like, you feel it in your, in your chest,right. And that's, that's satisfying, that's that's pleasant feeling. So that's the first thing that we'll do, make sure that the sound is balanced, but there is some bass"* (P02). Adding to the bass can then be a way to make a sound more juicy: *"I'm like, okay, the sound is good but could be a bit more juicier and you know, and they're like, ah, okay, so what, what should I add? And I'm like, okay, maybe more bass."* (P05).

Table 2. Through the content analysis, we mapped participants' varied conceptualized attributes of juicy audio. We note that this only represents attributes present in key passages of participant's direct descriptions of juicy sound; they may have still touched upon other attributes in a less direct manner in the remainder of their interview (e.g., where it was unclear whether they meant juicy audio or just good audio design).

Attributes of "Juicy Audio"	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
purpose & perception	·	·	·	·	·	·	·	·	·	·	·	·
avatar identification	·	·	·	·	■	·	·	·	·	·	·	·
emphasis of events	·	·	·	·	■	·	■	·	■	■	·	■
auditory decoration	·	·	■	·	■	·	·	■	·	·	·	·
eliciting reactions	·	·	■	·	·	·	·	·	·	■	·	·
mimicry of real-world expectations	■	·	■	·	·	·	·	·	·	·	·	·
enhancing feedback	·	·	■	·	·	·	·	·	·	·	■	·
satisfaction with sound	·	·	·	■	·	·	■	·	■	·	■	·
evocation of other senses	·	·	·	■	·	·	·	■	·	·	■	·
emotional impact on player	·	·	·	·	·	·	·	■	■	·	·	·
liquid connotation	·	·	·	·	·	·	·	·	·	·	■	·
playfulness	·	·	·	·	·	·	·	·	·	·	■	·
doesn't need to be pleasant	·	·	·	·	·	·	■	·	·	·	·	·
physical (visceral) listener reaction	·	■	·	■	·	·	·	·	·	·	■	·
meaningful feedback	·	■	·	·	·	·	·	·	·	·	·	·
rewarding feedback	·	·	·	·	·	·	·	■	·	·	·	■
attention-grabbing	·	■	·	·	·	·	·	·	·	·	·	·
conveys "weight"	■	·	·	·	·	·	·	·	·	·	·	·
technical attributes	·	·	·	·	·	·	·	·	·	·	·	·
full frequency spectrum	·	■	·	·	·	·	■	■	■	·	■	■
multi-layered sound	·	■	·	·	·	·	·	·	·	·	·	·
bass-y sound	■	■	·	·	·	·	■	·	·	·	·	■
context	·	·	·	·	·	·	·	·	·	·	·	·
game type specific	·	·	·	·	·	·	·	·	■	·	■	·
balanced without excess	·	·	·	·	·	■	■	·	■	·	·	·
fit to context	·	·	·	■	■	■	■	■	·	■	■	■
believable within context	■	·	■	·	·	■	·	·	·	·	·	·
no new information	·	·	■	·	·	·	·	·	·	·	·	·

Finally, some designers also pointed out the tail of the sound as an important leverage point for impacting its perceived shape: *"especially you can imply shape through the tail."* (P08). Audio can then be made more juicy, for example, by *"hav[ing] like maybe a cool tail of some special texture that kind of rings out"* (P09). This is commonly used for impact sonification, where the initial sound of a gunshot, explosion, or similar is *"followed by a trail"* (P01). While mentioned by fewer participants, it was clearly tied to making juicy audio: *"you have a football game and you kick a football. It just makes like <mimics sound> sound, and that's it. It's like, Hmm. Maybe a little more, let's juice it up a bit. And you would add like <mimics sound>, a bit more kick to it and maybe a small <mimics sound> tail when the ball leaves us like <mimics first sound> instead of <mimics second sound>; that's juice."* (P05).

4.3 Content Analysis: Further Mapping the Conceptualization of Juicy Audio

The content analysis approach was focused specifically on participants' extracted definitions of juicy audio (i.e., a specific subset of quotes from the interviews), and led to a wide array of different recurring characteristics. This helped to identify the most salient, crucial *attributes*, *synonyms*, and *examples* that were named explicitly as part of statements defining juicy audio. It provides a granular overview of how participants' understanding of the concept differed based on the characteristics they most immediately associated with it.

4.3.1 Attributes. Table 2 presents an overview of which attributes were brought up by each participant. We note that just because a participant did not list an attribute in their direct extracted definition(s) of the term juicy audio, they often still contributed to themes relating to that attribute in the thematic analysis, by using terms or giving examples associated with that attribute in their more emergent descriptions and discussions of what juicy audio is or might be. For example, the use of "bass" in creating juicy audio was present in four participants' definitions (listed in Table 2), yet was also noticeable for three additional participants (P04, P05, P09); e.g., by providing an example of how juicy audio could be designed: *"I would [...] kind of accentuate the player's button presses with a bit more base. So it kind of feels a bit more physical and visceral [...] So when you jump it's like, instead of just like <phew>, it'd be like, <boom>."* (P05).

The attributes can broadly be categorized in three ways: **1)** describing the *purpose* with which designers apply this kind of audio, and the listeners' *perception* thereof that designers aim to or expect to elicit; **2)** the *technical attributes* of juicy sounds; and **3)** the *context* in which juicy audio occurs and the ways in which juicy audio has to be designed to take context into account.

Purpose & Perception. The purpose and perception of juicy audio reflects the results of the thematic analysis, triangulating these findings, yet provides the most salient, crucial attributes that were named as clearly part of it. Viewed through Table 2, we can see how the different attributes co-occur for the different participants. For example, P2 primarily viewed juicy audio as eliciting visceral reactions, providing meaningful feedback to player actions, and grabbing players' attention. Feedback was mentioned by many participants, but with different framing: juicy audio as *enhancing feedback*, as explicitly creating *meaningful feedback* or *rewarding feedback*. The attributes *emphasis of events* and *auditory decoration* (as functions of juicy audio) are also quite similar. Other definitions focused more on the effect on the player, mentioning that juicy audio is *eliciting reactions*, sometimes specified as eliciting *emotional impact on [the] player* or in other cases a *physical (visceral) listener reaction*. *Evocation of other senses* was common, but for one participant this was specifically described as a view that juicy audio *conveys 'weight'*, while another participant reported specifically a *liquid connotation*.

Technical Attributes. Seven participants brought up technical attributes when explicitly defining juicy audio. Most commonly this was the *full frequency spectrum* (for P02 this also involved layering of sound), and *bass-y sound*.

Context. Context attributes were brought up by almost all participants in their definitions. For many, juicy audio demonstrates *fit to context* in general, while for a few others, it more specifically was about being *believable within context*. Several definitions pointed out that there is a limit to juicy audio's usage, requiring it to be *balanced without excess*. Two participants felt it was more likely to appear in some games than others (*game type specific*); namely more in Triple A games than wholesome ones (P09) or in more action-heavy ones than relaxing ones (P11)—though they also named *Candy Crush* as an example of juicy sound. Finally, one participant felt strongly that juicy

audio only occurs in contexts where it provides *no new information*, reflecting their perspective of its primary function as auditory decoration.

4.3.2   Synonyms and Examples. In addition to the described attributes of juicy audio, we also analysed the synonyms that participants used when describing juicy audio explicitly (although again these synonyms occurred often and throughout many transcripts outside of the extracted definitions). The results are wide-ranging and varied; see Table 3. We distinguish here between full and partial synonyms, depending on whether it was clearly used as a synonym for juicy audio (full) or as an overlapping concept (partial) in the transcript. Two participants used *punchy* as a full synonym—this was generally a common term used in the interviews. It was also used as a partial synonym in several other definitions, i.e., they viewed punchy as an overlapping concept: *"I guess most juicy sounds are punchy [...] Most punchy sounds are juicy, but, but yeah, a juicy sound is not necessarily punchy, like for example, charging."* (P02). *Spicy*; *crunchy*, *meaty*, and *crusty*; as well as *clean* were each used in only one participant's summary. However, *crunchy* re-occurred as a partial synonym for one participant's definition. We also observed references to colours as partial synonyms—*"I mean, there's so many terms and some people use like purple green, yellow, blue. It's so many."* (P05)—as well as descriptions of texture, moisture, and magnitude.

In addition to the synonyms, many audio designers referred to examples to describe juicy audio. Such examples included descriptions of potential sounds, e.g., *"a grenade launcher [...] something heavy that fires really deep"*-P01, *"fake imaginary sounds"*-P03 like the dropping sound in cartoons, gory sounds in horror games, or lion roars embedded in car engine starting sounds. They also referred to specific examples embedded in existing games and media. Participants specifically pointed out: sounds for special abilities in *Destiny 2*, the sound of Finisher kills in *Doom*, boss rooms in *Dark Souls* and *Bloodborne*, attacks in *Super Smash Bros.*, end-of-level reward sounds in the *Star Fox* series, gun sound effects in *Apex Legends* and *Battlefield*, and creature sound effects in *Demon's Souls*. *Minecraft* was mentioned by multiple participants, specifically its sound when building a wall, breaking a block, and when picking up items.

Outside of games, they also mentioned the congratulatory sound effect upon level completion in *Duolingo*, the T-Rex scream in *Jurassic Park* movie, and general user interface (UI) sonification: animated UI elements in *Persona Five*, *Slack* notifications, and scrolling through the menu in *PlayStation* and *Nintendo* systems.

5   Discussion

Our work clearly demonstrates that the term juicy is used in industry by audio practitioners, and is understood tacitly even by those who had not come across it before, five of the participants had no familiarity with the term but were still able to discuss it once provided with a definition (see appendix A for summaries in Table 4). The juicy framework by Hicks et al. [19] applied well to the interviews, showing that the previously identified attributes of juicy design in visual contexts is reflected in auditory contexts as well. However, the thematic analysis clearly demonstrates additional attributes in juicy audio, which we discuss below in more detail. With this, we pinpoint the conceptual boundaries between visual and auditory juicy design, showing both the overlap and distinctions.

5.1   Juicy Visuals vs. Juicy Audio

Hicks et al.'s juicy framework served as a useful tool for comparing how audio designers and game designers perceive juiciness in their respective disciplines. Some elements of the framework in the deductive analysis had quite a low representation such as **Focus of Attention** and **Highlighting**, this lower representation might reflect a more nuanced application of these elements in game audio

Table 3. The interviewed audio designers used the below variety of terms as full or partial synonyms for juicy audio when defining the concept: ■ used as full synonym; □ used as partial synonym (overlapping concept; juicy is often also X—but does not have to be X).

Synonyms of "Juicy"	Participants											
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
punchy	□	□	.	.	.	.	.	■	.	.	□	■
bass-y	□	.	.	.	.	.	.	.	.	.	.	.
thick	.	.	.	□	.	.	.	.	.	.	.	.
dry	.	.	.	□	□	.	.	.	.	.	.	.
wet	.	.	.	□	□	.	.	.	.	.	.	.
spicy	.	.	.	■	.	.	.	.	.	.	.	.
crunchy	.	.	.	.	■	.	.	.	□	.	.	.
meaty	.	.	.	.	■	.	.	.	.	.	.	.
crusty	.	.	.	.	■	.	.	.	.	.	.	.
rusty	.	.	.	.	□	.	.	.	.	.	.	.
purple	.	.	.	.	□	.	.	.	.	.	.	.
green	.	.	.	.	□	.	.	.	.	.	.	.
yellow	.	.	.	.	□	.	.	.	.	.	.	.
blue	.	.	.	.	□	.	.	.	.	.	.	.
clean	.	.	.	.	.	.	.	■	.	.	.	.
massive	.	.	.	.	.	.	.	□	.	.	.	.
beef-y	.	.	.	.	.	.	.	□	.	.	.	.
visceral	□	.	.	.	.	.	.	.	.	.	.	.
exciting	□	.	.	.	.	.	.	.	.	.	.	.
oomph	□	.	.	.	.	.	.	.	.	.	.	.

design. Other aspects of the framework were rarely mentioned, suggesting these areas may not be as heavily prioritised by audio designers or there may be a difference in how they communicate these elements. The analysis also highlighted aspects of juiciness that extend beyond the juicy framework, such as considerations around satisfaction, accessibility, user interface feedback, specific sound elements, and the concept of feedback diegesis. Some of these missing elements may be specific to audio, but elements like satisfaction are likely applicable to visuals and other communication channels to the same extent. Overall, while all areas of the juicy framework were represented in the data, the extent of their representation varied, indicating a diverse range of priorities and practices among game audio designers. Further, there may be gaps in the framework when being used to understand game audio. For example, the framework holds no mention of how juicy design in audio evokes other human senses , yet this was a prominent aspect of juicy audio juicy (theme synesthesia; discussed more below).

The purpose and perception of juicy audio attributes identified in the definitions through content analysis reflect many results of the thematic analysis, triangulating these findings. Our combined process of the thematic analysis across the all the data, and targeted content analysis on direct definitions of the term within the data allowed us to narrow down the results of the thematic analysis. Essentially, the content analysis highlights the attributes, synonyms, and examples which hold clear immediate association with the term among expert audio practitioners.

enhancement/augmentation
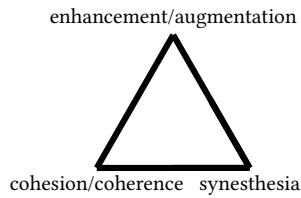
cohesion/coherence   synesthesia

Fig. 2. All interviewed audio designers relate juicy audio to at least two of these factors: emphasis/augmentation, cohesion/coherence, and synesthesia.

5.2 Juicy Audio Triangle: Emphasis/Augmentation, Coherence/Cohesion, and Synesthesia

In reviewing our findings, we observe three key factors as primary drivers of juicy audio (Figure 2). Based on the interviews, not all of these factors need to necessarily be present for audio to be considered juicy. The attributes detailed above have gaps in that not every participant explicitly shared the same examples, but this highlights there is diversity in opinion and that there is still some subjectivity in juicy game audio design. However, in defining juicy audio, every participant described at least one of these factors, and often two or three of them. In the broader scope of the interviews as a whole (when giving examples of potential juicy audio and speculating on how to design it), this was even more pronounced. Two of them were known already from the juicy framework by Hicks et al. [19], while the third appears novel to juicy audio specifically based on what the audio designers stated:

Emphasis/Augmentation. Juicy audio has a strong usage domain in emphasizing player actions or in-game events, as well as augmenting visually presented information to create more vivid feedback and thereby stronger impacts on player experience. This is well represented in the deductive thematic analysis and prior framework [19] with categories like impactful actions, exaggerate, focus of attention, highlighting, confirmatory feedback, and relevant feedback. It was also clearly present in the inductive thematic analysis through emphasis/augmentation, feedback, connection with enjoyment and satisfaction, communication with the player, and fatigue/novelty. Further, the content analysis shows that this is a clear association for most participants with regards to the purpose and perception of juicy audio (with attributes like auditory decoration, emphasis of events, rewarding feedback, meaningful feedback, physical (visceral) listener reaction, emotional impact, and eliciting reactions). Prior work has also framed juicy design as embellishment, for example, primarily visual embellishment [20], but also in haptic embellishment [44] (cf. their proposed haptic design principle of exaggeration), indicating that this is a feature of juicy design across modalities.

Coherence/Cohesion. Juicy audio must be considered in the broader game context within it is embedded—both in terms of the other sounds present in the game, and its appropriateness with regards to visual game events, mechanics, and overall game atmosphere and story. Juicy audio often stands out, but must generally fit the game context; it may also be particularly evocative of the story being told (through game events, mechanics and story) by using the emphasis/augmentation factor to support the cohesion of the game experience as a whole.

This factor is also clearly present in the framework and deductive thematic analysis (e.g., Thematic Coherence, Complementary Game Elements, Mechanic, Relevant Feedback). It was less clearly present in the inductive thematic analysis (largely through the mimicry of real-world expectations, connection with unrealism, and mediation/diegesis themes). However, it was strongly present in the content analysis based on juicy audio definitions, specifically the identified context attributes

of fit to context, believable within context, and balanced without excess. All but one participant mentioned at least one of these three attributes in their definition(s).

There is surprisingly little work on how player experience is affected by a game's cohesion and coherence. It is largely likely assumed to be a hygiene factor that is necessary for basic usability to be met. Ribeiro et al. [39] described thematic cohesion as *"the harmonic fit of sounds and graphics to a shared theme"*; their user study suggests that thematic cohesion can impact perceived game atmosphere, but may not have a large impact on player experience or immersion through this variable alone. General design principles recommend that games should *"aesthetically coherent and creat[ing] the appropriate mood"* [1]—the latter even noting that this can be achieved through *"special audio effects"*. Our work suggests that perhaps juicy audio as a kind of special audio effect—whether through the characteristics that make it juicy, or mediated through the resulting effect of the audio standing out more through its emphasis—could be a way of manipulating perceived cohesion (e.g., thematic or aesthetic). Beyond games, Cunningham et al. [9]'s framework for aesthetics in sonic interaction lists context as one key factor, which is described in similar terms as cohesion/coherence: *"The sound meets the expectations of the user, being relatable to the current task and perceived to fit it well"*.

Finally, the importance of cohesion and coherence also acts as a balancing factor. Prior work on juicy design in different modalities [25, 44] has highlighted the same point about avoiding an excess of juice as is also emphasized by the expert audio practitioners. Singhal and Schneider [44] have proposed that too much juice may simply be overwhelming; our findings suggest it could be a combination of this (fatigue/novelty) but also cohesion/coherence.

Synesthesia. Juicy audio was frequently described in terms that evoke non-auditory senses. This is not present in the deductive thematic analysis and framework although earlier versions of the framework include mention of the visceral aspect of juicy elements. However, in the inductive thematic analysis, evocation of other senses through what we categorized as the synesthesia theme was very prominent. It was also visible in the extracted definitions (either evocation of other senses, liquid connotation, conveys "weight" or physical (visceral) listener reaction were present in five participants' direct definitions). This greater prominence in the inductive thematic analysis than the content analysis may suggest that this factor is more subconscious or latent in the participants' understanding of the term; it has more of an effect on how they talk about designing juicy audios than it does on how they define the term outright.

5.3 Implications

Synesthesia as a Key Factor in Juicy Audio. Part of the reason for metaphors invoking synesthesia for juicy audio may be due to the moniker itself: the association with juice may provoke liquid connotations. Certainly some participants brought up slime blob sounds, and wetness as a partial synonym. One reason for the prevalence of liquid metaphors in describing juiciness in audio design can be attributed to linguistic relativity, a theory on how the language we speak influences how we perceive and conceptualise the world [53]. Previous research discusses how linguistic categories shape thought processes, suggesting that the metaphors used in a language can guide how individuals think about abstract concepts [53]. Boroditsky [3] further supports this by showing that Mandarin and English speakers perceive time differently based on their linguistic metaphors, highlighting the role of language in shaping habitual thought. Svantesson [46] also explores how sound symbolism affects meaning, reinforcing the idea that linguistic relativity extends to how we describe sensory experiences. These insights suggest that the use of liquid metaphors in audio design may arise from the inherent influence of language on our conceptualization of sound.

Yet the link to synesthesia appears broader than only limited to liquid-based metaphors, to include also associations of weight and texture. Prior work has shown that synesthetic metaphors are a common way for *"naive listeners, who lack a specialized vocabulary"* to describe sounds, specifically, their timbre [29]. Our findings show that this is also the case—and works well—for many expert audio practitioners. While they are certainly in command of specialized vocabulary, it must be noted that their communication is largely with people with expertise in other areas: they were speaking to HCI researchers without training in audio theory, and in many cases describing their communication with clients, game designers, and game developers. Further, juicy audio is not yet an established term, thus motivating our research in the first place.

There are interesting parallels to this particular key factor in other non-visual, difficult to descriptive sensory phenomena. Singhal and Schneider [44] mention "sharpness" as one potential embellishment in juicy haptics. Describing prior tactile vocabularies, Obrist et al. [36] discuss similar uses of similes and metaphors. Game experiences as a whole are sometimes presented in synesthetic metaphors in game reviews (e.g., crunchy or heavy [26, 40]). Swink [47] in his breaking down of game feel, discussing the connected elements of creating immersive sensory-rich game experiences, is also similar to inducing the synesthetic responses highlighted in our work as a key element of juicy audio design.

Finally, we note that research on vocal sketching has even identified gestures and body languages as being integrated in the vocal sketching process [11]. This, alongside the hints of physical, visceral reactions in listeners, suggests that our findings of juicy audio having synesthetic qualities may in the future need to be expanded to consider it as an embodied experience and phenomenon, as is already explored in embodied cognition in the context of music [8].

Technical Design Implications: How to Create Juicy Audio. We do not claim that our findings are definitive; additional factors influential in causing audio to be perceived as juicy may well be found in future work. Nevertheless, the content analysis clearly identifies attributes that should be the foundation of the technical design and implementation of juicy audio: a full frequency spectrum, heavy bass, and likely a tail-shaped envelope. Returning to the existing study on effects of juicy audio by Smets and van der Spek [45], we observe that some of their mentioned alterations likely contributed to a full frequency spectrum (e.g., layered sounds), base-heavier sound (e.g., lower pitch), and even the more pronounced tail (e.g., added reverb for longer duration), but it is not clear to what extent this was the case (i.e., how full was the frequency spectrum, how heavy was the base). More detailed, grounded, and systematic exploration of these factors can now be envisioned based on our findings, contributing to future work on designing and assessing effects of juicy audio.

Conceptual Boundaries of Juicy Audio. This work presents a detailed overview of how experts in the game audio industry think of, describe, and use the term juicy in the context of audio. The identified themes from overall, rich interviews, as well as the attributes, synonyms, and examples that we identified in the explicit definitions of the term, together represent a foundation for systematic research on the design of juicy audio and the evaluation of its effects: first steps towards operationalizing juicy audio. audio practitioners, game designers, and researchers alike can use the identified characteristics as a starting point for discussing what makes audio juicy, designing audio to be juicy, and assessing whether it is perceived as such.

In other disciplines like medical/nursing research [33, 37] or social science [48], there have been related approaches to concept formation or mapping. Morse et al. [33, p.269] (in their Table 5) formulated criteria for assessing the level of maturity of concepts. Based on these, we can classify juicy audio as an *immature* concept in the field so far: the phenomenon is poorly understand, there is a gap in explanatory competing concepts, its parameters are difficult to identify and often overlap

with other concepts, and there is little to no basis for the evaluation of the concept's fit with specific audio phenomena.

While our specific methodology differs, we draw from Penrod and Hupcey [37]'s discussion on criteria for concept-based inquiry (based in turn on Morse et al. [33]'s work). They describe principles for assessing concept development:

- epistemological (*"is the concept clearly defined and well differentiated from other concepts?"* [37])
- pragmatic (*"is the concept applicable and useful within the scientific realm of inquiry? Has it been operationalized?"* [37])
- linguistic (*"is the concept used consistently and appropriately within context?"* [37]), and
- logical (*"does the concept hold its boundaries through theoretical integration with other concepts?"* [37])

Our findings clearly show that there are clear recurring characteristics to this concept that the expert participants agree on, although there is no consistent agreement on how it differs from some other terms (i.e., some view juicy as synonymous with punchy, while others view these as overlapping but distinct phenomena). Thus the concept's ability to meet the epistemological, linguistic, and logical principles are promising, though not yet sophisticated or complete. We argue that the concept easily meets the pragmatic principle of usefulness and applicability—though primarily, in our data (given its origins), within the game industry realm of inquiry. There is very clear evidence of it being operationalized in this context, and providing value to sound design and communication.

Returning to Morse et al. [33]'s criteria for concept maturity, our research provides a first comprehensive description of the phenomenon, establishes potential competing concepts (through the synonyms) from which comparative questions can be developed in future, identifies likely parameters and establishes a basis for future evaluation of the concept's fit of the concept to auditory phenomena. In this manner, our contribution lies in pushing forward the maturity of this concept of game audio design from *immature* towards *partially developed*.

Limitations. Our approach towards conceptualizing juicy audio is comprehensive but exploratory, and must be considered in light of its basis in a selection of interviews. A larger sample might have provided additional attributes of juicy audio. We note that the interviewed audio designers did not always hold a clear conceptualization of juicy audio, and sometimes also presented contradictory views on the term. Participants' responses in describing juicy audio were sometimes straightforward and promptly reported, but often also emergent, i.e., their understanding of the term developed as they talked about it. We believe that this is inevitable when in the stage of trying to untangle a term in a broad context of use. The contradictions or gaps in how the concept is delineated indicate that diversity in opinion remains. Participants' conceptualization of the term—both in the interviews as a whole, and in the extracted definitions—likely also depends on the designers' specific background in terms of duration of audio design experience, diversity in experienced game genres, training, and so on. The juicy audio definitions resulting from our work align with existing definitions for non-audio juicy design, but it would be useful to present these definitions back to audio designers for further insight into their understanding.

Our findings will have to be validated in future empirical work (e.g., by designing audio to feature identified key aspects of juicy audio, and evaluating this via rating scales)—though, to some extent, fuzzy boundaries and delineations of the term are likely to remain due to the well-documented subjective nature of audio perception [2, 5, 28, 41]. Yet we hope that the patterns we identified will persist as frequently occurring, as they are based on rich data from a broad range of interviewed industry audio experts, and connect well with the existing related literature.

6 Conclusion

Through expert interviews with game industry audio practitioners, this paper presents a comprehensive exploration of the concept of juicy design specifically through game audio. In a two-step approach, we apply 1) a hybrid (deductive and inductive) thematic analysis on the interviews as a whole, as well as 2) a content analysis on extracted definitions. The thematic analysis demonstrates how well an existing (not audio-specific) framework on general juicy design applies to the auditory medium, and provides a rich perspective on how audio design practitioners think of the concept of juicy audio, as well as how they design it. The developed themes, and the attributes, synonyms, and examples of juicy audio presented in the content analysis, identify emphasis/augmentation and cohesion/coherence, and synesthesia as key factors in juicy audio, providing a basis for future research and design.

Acknowledgments

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A Appendix - Summaries of the Participants' Understanding of Juicy Audio

Participant	Summarized Understanding of "Juicy Audio"
P1	This participant's definition of juiciness sits around 1) making sure that the sound effect is believable in the context of the game environment and if the sound effect has a real world counterpart it also matches expectations and 2) making sure the sound conveys the weight of the thing in the game. Such as a grenade launcher having a heavy bass-y sound effect when firing. To them juiciness has several names such as "punchy" or "bass-y" that are used as a shared lexicon among colleagues such that the words become an effective designer shorthand. The participant details measurable attributes of the sound element that they believe that feeds into make it juicy such as bass-y but they also convey high-level aspects of the sound around how the player perceives the sound, these attributes help communicate information to shared colleagues. There is a difficulty in describing audio necessitating a need for sharing examples and usage of onomatopoeia.
P2*	This participant has some clear expectations on what a juicy sound effect should be; it needs to be a suitably novel effect that draws the attention of the player and provides meaningful feedback to the player that cuts through the non-juicy sound effects. Bass plays an important part of making a juicy sound effect resonate and be physically felt by the player. Making sure the sound uses the entire spectrum and not just bass is equally as important. Lastly, this participant also discusses the shape of punchy sounds with consideration to what can make them punchy such as the sharpness of the sound. Punchy is a similar term but with tactile connotations and has overlaps with juiciness but is not necessarily the same thing.
P3*	This participant's understanding of audio juiciness is that it operates in a separate space from other aspects like visual effects. Juicy audio exists as a thing that sits on top of the other communication channels and should not include new or novel information about the game state but should directly enhance the existing feedback happening. One important aspect highlighted here is the importance of the juicy sound being believable in the context of events and making use of mimicry of real world counterparts but with enhancements (but does not have to be realistic). Juicy sound effects should not be teaching new information about the game state, instead juicy sound effects operate in the decorative space, they may be included for their own sake or to create a reaction.
P4*	Primarily the participant sees juiciness as a subjective perception that primarily indicates appreciation for sound(s) in a specific context that evoke satisfaction ("good" sound with good "fit" to a context) - but on its own it does not communicate particular sound attributes and so is of limited use for sound design communication. This participant uses several words that go alongside juiciness, wet-ness thickness, dryness. These terms are used to help describe some slightly intangible aspects of the sound that cannot be measured in the same way that the bass or frequency can be. These terms can be useful but only when used with the appropriate context otherwise they are not actionable by the creator. However despite this relegating of "juicy" to primarily indicate satisfaction, they also do describe it in terms of visceral sounds and sounds that speak to other senses ("thick", "wet"), which may be a bit contradictory OR speaks to the participant's personal taste / preferences.
P5*	Juicy sound as sound that is accentuated in the sense of emphasizing details of a sound and/or adding in additional details of a sound (to accompany a visual event). This can be used with the purpose of connecting the player to the character through the emphasis of certain actions. Juicy sound is seen as a recipe with multiple ingredients with the goal of the accentuation of things.
P6	Juicy sound as an attribute that can only occur through the the sound's integration with game visuals and game events, and describes a particularly good "fit" of the sound within that context. Because of this "fit" requirement, juicy sound has a limit and the emphasis it provides can eventually become too much (too "over the top") - at which point the sound is no longer juicy anymore, because the fit is lost. The fit with visuals also makes communication between designers particularly important, and emphasizes believability in relation to cohesion.
P7	Juicy sounds are satisfying but also more than satisfying; they help to emphasise and accentuate big and special events. They do not have to be pleasant: even gory and violent SFX can be juicy and satisfying, even while also being "very disgusting". On a technical level, juicy sounds have a many layers and frequencies, and particularly have a good base. Standalone juicy sounds may no longer work as juicy when integrated into a game / with visuals. There is a limit to juiciness in games because juicy sound draws attention inherently, which can be overwhelming and distracting.

Table 4. This table presents the summaries of how the interviewed audio designers understand juicy audio. * denotes participant had a prior understanding of juicy as design term. The overview is continued in Table 5.

Participant	Summarized Understanding of "Juicy Audio"
P8*	The participant seems to think all audio is juicy provided the right context but makes no clear distinction between juicy and non-juicy. They feel that juiciness is a core component of the design process. Yet juicy sound is primarily a feature of the player's perception of the sound, so about the sound's "impact". On a technical level this results from the sound's features (it's "shape" and "cadence", which at least partly relate to long, full frequencies), as well as how well the sound fits in with other sounds (by complementing them through replication/echoing + augmentation, or by contrasting with them). It is important that juicy sound synchronises with visual events in a game, and can in this way be used to add "a sense of tactility". In this way the auditory sense can carry along or support an emergent haptic sensation. As a term, "juicy" is more established in an academic setting than an industry one, although it is used in both regardless of the term usage, it is applied in their work.
P9	Juicy sounds are closely related to satisfaction, and juicy sound is always satisfying, even though satisfying sound is not always juicy. On a perceptual level, sound is juicy when it has an impact on the player: an emotional reaction. On a technical level, it is "thick" (i.e., contains many layers). Juicy sounds cannot be used too much otherwise they will no longer be juicy and lose their importance due to listener fatigue. This makes juicy sound design a game design challenge, as juicy sounds should be used for special actions that are not repeated too often or too quickly. It is more likely to occur in "triple A" games than "wholesome" games.
P10*	Juicy as a term is not commonly used at least by this designer's team, but is a way to emphasize certain events and add impact to impactful moments. This participant expressed a unique way in which they understood and applied the term to their design approach but would state some potential reluctance to use the term juiciness as a communication tool. It is inherently in opposition to "the down moments" and "quieter moments" which are needed for the juicy audio to shine. In general, there are many audio components in games, which makes layering & management of all the different audio aspects a challenge and constant consideration to avoid overwhelming people. Their understanding of juiciness is not exclusive to games but also occurs in other media. However, due to the many moving pieces of a game it presents a challenge to ensure impactful juicy moments happen as expected.
P11*	The participant has a complex and slightly conflicting concept of what juiciness is in the context of audio. They believe that good feedback effects will be satisfying and resonate with the player's actions; in this way, the sounds are not cognitively appraised so much as immediately felt on a visceral or "primal" level. The participant has a fluctuating understanding of the term juiciness: these satisfying sound effects might be considered juicy or crunchy etc. but do not have to be. There is some confusion about whether juicy sound is satisfying as a synonym or whether this is a separate thing: Juicy sound is satisfying but satisfying doesn't always imply juiciness. They see a distinction between juicy and crunchy, with juicy being more playful and containing "fun-ness" (which on a technical level can be achieved by adding a synth) and making the sound feel less serious than crunchy. On a technical level, juicy sound is associated more with "texture" and "full"-ness, i.e., a haptic sensation and/or possibly implying multiple layers of sound or frequencies. They prescribe that juicy sounds can contain but do not need a sharp attack, which is more present or more required in punchy or crunchy sounds. These latter sounds convey more "energy" and "attack" which may relate to intensity. Juicy sound often has a liquid / fluid / slime connotation, like sounds that occur when something splashes on impact. All three terms imply high action sounds and typically appear in and is more suited to action-heavy rather than relaxing games (and other media). Candy Crush is an example of juicy sound.
P12	Juicy as a term is only loosely defined but most people understand what is meant by it. It is the same as or similar to the term "punchy". Juicy sounds are experienced as rewarding. It works as an emphasis for special moments, i.e., it is important that it doesn't become commonplace among other sounds in the game. This effect on the listener is due to attributes of the sound's cadence, pattern, or rhythm. On a technical level, juicy sounds are "bigger" and "fatter" and more sustained, and the low end of the frequency spectrum i.e., the bass is particularly important in making it so.

Table 5. This table continues the summaries of how the interviewed audio designers understand juicy audio. * denotes participant had a prior understanding of juicy as design term.

B Appendix - Questions in Semi-Structured Interview

Introductory Questions. Could you summarise your experience in audio design?

Do you have any experience in game audio design? Can you detail?

How would you classify the projects you have worked on in regards to team size? (Indie (small teams), AAA (big teams), AA (funded, medium team size 10–30 people), other)

How many years experience do you have as an audio designer? ...and as a game audio designer?

What kind of games/genres have you worked on? And what type of audio have you worked on? How did the audio design differ across different game genres?

Question block 1 - How do/would (game) audio designers design (game) audio sound effects for feedback? Could you talk us through your process (actual or hypothetical) of creating a sound effect for a game? Is the audio effect driven by an existing game mechanic?

What considerations do you have and why? Are there certain aspects you consider more? (follow up: why do you consider these aspects more?)

Do you consider how the audience will interpret the sound effect in terms of feedback? What considerations do you have?

What makes a good sound effect in games? Can you describe some examples, from your experience as a designer and/or player? Why do you think they worked well?

What about sound effects specifically for player feedback?

What makes a bad sound effect in games, from your experience as a designer and/or player? Can you describe some examples, and why you think they were bad? How could they be improved?

What about sound effects specifically for player feedback?

Do you think there's a difference between designing audio for interactive media/ non-interactive? (What type of audio designer, follow-up questions: How does game/interactive/non-interactive audio design compare?)

Question block 2 - Have (game) audio designers come across the term "juicy" design, how does it relate to audio design - within vs. outside of the games context? Have you heard of "juicy" design? How would you describe "juicy" audio design?

Definition (read and provided if participant has not heard of the term):

> *"Juiciness emerges from coherent design of game mechanics and visuals, while providing confirmatory, explicit and ambient feedback. Juiciness extends beyond just providing superfluous feedback and categorises the type of feedback necessary for a game to feel juicy. The non-feedback elements of a game need to be coherent, it is not enough to just add feedback elements to make a game juicy if the underlying experience is not well designed."*

Have you come across a similar term, or phrase that is used to convey these aspects of sound effects? Both within the games context and outside of it?

Have you used this technique in your own work, and why / when? Can you describe examples of juicy audio in games (from your experience as a designer and/or player)?

What do you think makes a "good" juicy sound effect? Can you describe some examples (from your experience as a designer and/or player)? Why do you think they worked well?

What do you think makes a "bad" juicy sound effect? Can you describe some examples (from your experience as a designer and/or player)? What made them "bad" and how could they be improved?

Do you think that this kind of "juicy" audio design (or whatever term you prefer) manifests outside of game audio as well? If yes, can you describe some examples? Does it differ to game audio in any way?

Considering the "classic" example of fizzy drink commercials that showcase these aspects a lot, is that something you would consider "juicy" audio design?

Question block 3 - How do (game) audio designers consider sound effects for feedback to affect player experience? (Which elements / criteria of SFX -> which elements of PX). How would you describe the player experience? What elements of player experience do you consider important? Why?

Do you think SFX feedback targets particular aspects of the player experience? What aspects, and how do you think sound effects affect them?

What sound elements or sound criteria do you consider most important for sound effects for feedback? (If they hesitate, prompt some examples: So criteria for example like volume, pitch, having bass, having a warm or cold aesthetic, etc...)

So imagine you are tasked with designing juicy sound effects for feedback in a game. Would you differentiate between how you design these sound effects based on what information the player needs to receive from the feedback element, or how important the feedback in that segment of the game?

(If they hesitate, prompt some examples: how time critical player reaction is, how central / relevant is the information being conveyed to the current game segment or narrative, how explicit is the information being conveyed vs. requiring interpretation, ...)

Demographics. Would you be willing to disclose your gender and age?

Which country do you live in, and which countries have you worked in?

Do you play digital games yourself? How would you describe your playing habits?

C   Appendix - Summary of Thematic Analysis

Themes and Subthemes	Codes
audio industry practice	audio commonly post-processing; sound specialization over time; audio design vs. audio programming; dev/designer input/discussion; audio design vs. audio programming; no fixed process in audio design; separation of sound creation vs. balancing; playtesting; generating sound vs. curating existing sounds; industry tales: gun sound vs. stats; capturing sound is time intensive; scaling issue; headphones/speakers as limiting factor; repurposing sounds (e.g. via pitching); data size concerns; empty space - designing what's not there; audio design driven by worst case scenario
general characteristics of audio	subjectiveness of sound/audio; sound design not generalizable; universal intuition / feeling of sound design; complexity of audio (vs. visuals); complexity/cost of audio (vs. visuals); influence of genre
sound design communication	sound reference in design; sound descriptions / communicating sound / vocal sketching; existing sound examples; sound example / mimicry; sound descriptions
juicy sound signal attributes (shape)	phasing effects; reverb; build-up; curve-down / trail / tail; base/bass parts of sound; full spectrum / broad frequency range
interactivity & different media/mediums	impact of camera perspective; interactive media: many factors; audio design differs for device/medium; juicy as medium-agnostic; agency
other game audio types	dialogue / narration; foley; juicy dialogue; BGM vs. SFX; juicy music; music vs. SFX
juicy sound in broader sound landscape	layering sound; volume mgmt; arranging sound / integration
mute-ableness of audio	mute-able experience; muted audio still exists; sound off as player choice
"goodness" of sound	"good" sound; "bad" sound
effect/purpose: user experience	sound for aesthetics vs. function; bad sounds as "break" / immersion; SFX for immersion; player experience; sound for emotions
juicy sound as a concept	juicy/non-juicy sound example; juicy definition/description; experience with term juicy design; potential juicy synonyms
▪▪▪ › context/perception: valence	negative but juicy sound
▪▪▪ › attribute: synesthesia	audio in terms of other senses; sound for tactile feeling; colourful sound
▪▪▪ › attribute: musicality	harmonic quality; sounds from instruments; musical-ness
▪▪▪ › effect/perception/purpose: emphasis/augmentation	artificial sound; emphasis for special events; exaggerated / superflous / embellishment / unnecessary frills; juicy as enhancing; simple/clean vs. complex audio
▪▪▪ › VERSUS attribute: mediation / diegesis	subtle sound / non-distracting; pretense of non-mediation / "apparent" sound design
▪▪▪ › attribute: connection with unrealism	realism / unrealism; virtual reality audio; juicy as abstract/unrealism; physical sound realism / spatial sound; comic book sound descriptions
▪▪▪ › attribute: connection with coherence / cohesion / expectations	coherence with visuals; non-coherence with visuals; dissonance in audio; sound tropes; coherence / cohesiveness overall; expectations match/break; media expectations / metaphors
▪▪▪ › effect/purpose: feedback	multimodal feedback; juiciness doesn't have to be about feedback; sound for feedback; feedback not always best choice; feedback example; feedback as priority sound
▪▪▪ › attribute: connection with enjoyment & satisfaction	rewarding; satisfaction in sound; fun
▪▪▪ › effect/purpose: branding / recognition	memorable/recognizable SFX; custom sound vs. generic
▪▪▪ › effect/purpose: fatigue / novelty	variances / non-repetition; sound fatigue; new/novelty of audio
▪▪▪ › effect/purpose: communication with player	player engagement goal; player perception as a factor; pitch as attention grabbing / pitch mgmt; guiding player attention; sound to challenge player
▪▪▪▪▪ » effect/purpose: communicating character	sound origin moved to player; avatar audio; sound for characters
▪▪▪▪▪ » effect/purpose: communicating objects	sound for object communication
▪▪▪▪▪ » effect/purpose: communicating mechanics	communicating game mechanics sound for conveying mechanics/goals
▪▪▪▪▪ » effect/purpose: communicating story	sound design as storytelling; sound for pacing

Table 6. This table presents an overview of the codes and higher-order themes (bold font in the main manuscript; themselves also hierarchical) as the resulting codebook of our analysis.