On the Design of OLO Radio: Investigating Metadata as a Design Material

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ABSTRACT
With the massive adoption of music streaming services globally, metadata is being generated that captures people's music listening histories in more precise detail than ever before. These metadata archives offer a valuable and overlooked resource for designing new ways of supporting people in experiencing the music they have listened to over the course of their lives. Yet, little research has demonstrated how metadata can be applied as a material in design practice. We describe the design of OLO Radio, a device that leverages music listening history metadata to support experiences of exploring and living with music from one's past. We unpack and reflect on design choices that made use of the exacting precision captured in listening history metadata archives to support relatively imprecise qualities of feedback and interaction to encourage rich, open-ended experiences of contemplation, curiosity, and enjoyment over time. We conclude with implications for HCI research and practice in this space.

Author Keywords
Digital Music; Metadata; Temporality; Interaction Design; Research through Design.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Since the early 20th century, people's practices of collecting, possessing, and listening to music have played important roles in supporting self-reflection [5,23], self-presentation [48,55], and socially connecting with others [4,41]. We now live in a world where people's lives are increasingly mediated by digital systems and online services. These technologies have enabled people to create personal archives of digital music at scales larger and rates faster than ever before. Indeed, digital music remains one of the most ubiquitous, enduring, and continually evolving forms of personal digital content [27]. As an example, users of the music service Spotify listen to over fifty-five million hours of music from their collections daily; and, on a global level, over one trillion songs in online music collections are streamed annually through digital music services [34].

These huge collections pose new challenges for the HCI community. As personal digital music archives grow larger, they become progressively invisible, lacking the material presence that might enable people to casually notice and engage with them [38]. Internet-enabled digital music applications, such as Spotify, also strongly emphasize the recommendation and acquisition of new music. While this is a valuable service, it can also complicate people's acts of curating their own growing collections and inhibit their capacity to 'look back' and explore past tastes [31]. More broadly, the shift to cloud-based systems can also cause losses in awareness of exactly what is contained in one's personal digital archive, as well as where it resides, as 'it' becomes fragmented across servers and devices [20,40].

Interestingly, as a byproduct of people's interactions with their online digital music, a standardized, readily accessible form of metadata is now generated that captures exactly *what music people listened to and when* in more precise detail than ever previously possible [12,31,53]. Yet, the productive application of metadata like this has largely been overlooked and unexplored in design [18,38]. In parallel, research recent in HCI has highlighted the critical need to design technologies that express alternative representations of personal data capable of enabling experiences that expand beyond "*an exclusive interest in performance, efficiency, and rational* [self] *analysis*" [7, p. 48]. Yet, specific examples demonstrating how such rich and unique engagements with personal data can be supported through the creation of new design artifacts are sparse.

How will personal digital music archives be meaningfully experienced as they grow to a size and scale that people have never previously experienced? How might rich, emergent, and ongoing experiences be supported with them as they age over time? And, what opportunities exist for leveraging metadata as a material for designing technology that supports new ways of experiencing the trajectory of digital music one has listened to across their life?

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Figure 1. Drawing on a user's archive of digital music listening history metadata, OLO Radio embodies the lifetime of music a user has listened to. The motorized linear slider and 3-switch knob exhibited on the left cabinet enable the user to explore, interact, and listen to music from their past across different timeframe modes; the rightmost knob controls on/off and volume.

To explore these questions and ground our own thinking in this emerging space, we designed *OLO Radio*, a robust interactive device that leverages a user's dynamic archive of listening history metadata to embody the lifetime of digital music she has previously listened to. OLO Radio uses the exacting precision offered by metadata to enable a user to interact with music from her past through three 'timeframe' modes (year, month, time), which is controlled by a knob adjacent to an actuated linear slider. The position of the slider represents—and is encoded to—a 'point in time' in the user's past that is relative to the timeframe mode. When OLO Radio is turned on, it begins playing the song queried from the specific metadata listening instance encoded to the slider's current position (e.g., Time: 20:41; Date: 09/09/2011; Artist: Jay-Z; Song: Dead Presidents II). If left untouched, OLO Radio will continuously play music, slowly moving forward in time (subtly represented by the slider itself very slowly advancing forward). If the user moves the slider, it will play music associated with the location 'in time' it stops on. If the user changes the timeframe mode while a song is playing, the music will continue playing as the slider moves to the precise position on the slider where that metadata instance is located. This enables the user to explore a wide range of temporal connections between different songs listened to at different points in her past.[1]

Yet, OLO Radio's design in terms of user interface feedback and aesthetics is quite minimal. This overarching design quality enabled us to leverage the precision offered by music metadata to support a range of rich *open-ended* experiences with music from one's past in ways that can change over time. Here, our use of 'open-ended' aims to capture the wide range of emotional, reflective, curious, serendipitous, intriguing, and pleasurable kinds of experiences (among others) that can emerge from encountering artifacts, media, and memories bound to one's past. Yet, engaging in the design of this device did, however, produce challenges in balancing the sheer quantity and diversity of information captured in a single user's metadata archive with our goal of supporting open-ended and evolving engagements. Such issues and experiences we encountered through our design process provoked us to critically consider how designers interested in making technologies that manifest data in forms that can support open-ended (versus goal-directed) experiences over time could be better supported in the future. It is these insights that emerged through the making of OLO Radio that we reflect on in this paper. Next, we provide a brief background; describe our design process; and reflect on and interpret implications emerging from our Research through Design (RtD) process for future HCI research and practice.

[1] Please see our video figure for a demonstration of OLO's interaction and experience design.

BACKGROUND

In their seminal article, Mazé and Redström argue that the increasing presence of technology in everyday life requires designers to "*investigate what it means to design a relationship with a computational thing that will last and develop over time – in effect, an object whose form is fundamentally constituted by its temporal manifestation*" [33, p. 11]. They articulate an agenda aimed at designing relationships with computational artifacts that will grow and change through time. Over a decade later, these issues remain critical in the HCI and design communities, and there has been a resurgence of work investigating the complex intersection of time, technology, and design [e.g., 19,25,32,44,54]. Concerns of temporality are also intersecting with HCI works that articulate the need for more research investigating how personal digital data might meaningfully persist, evolve, and find a fitting place in people's everyday lives and environments [9,39,51].

More generally, there has been increasing interest in the development of new knowledge through the construction of design artifacts in the HCI community. Fallman [10] argues the core activity of design research is giving form to previously nonexistent artifacts to uncover new knowledge that could not be arrived at otherwise. Researchers such as Gaver et al. [15], Sengers et al. [46], Zimmerman et al. [56], Bardzell et al. [2], and Stolterman and Wiberg [49] have articulated design-oriented approaches that are united in their emphasis on the act of making as a means to

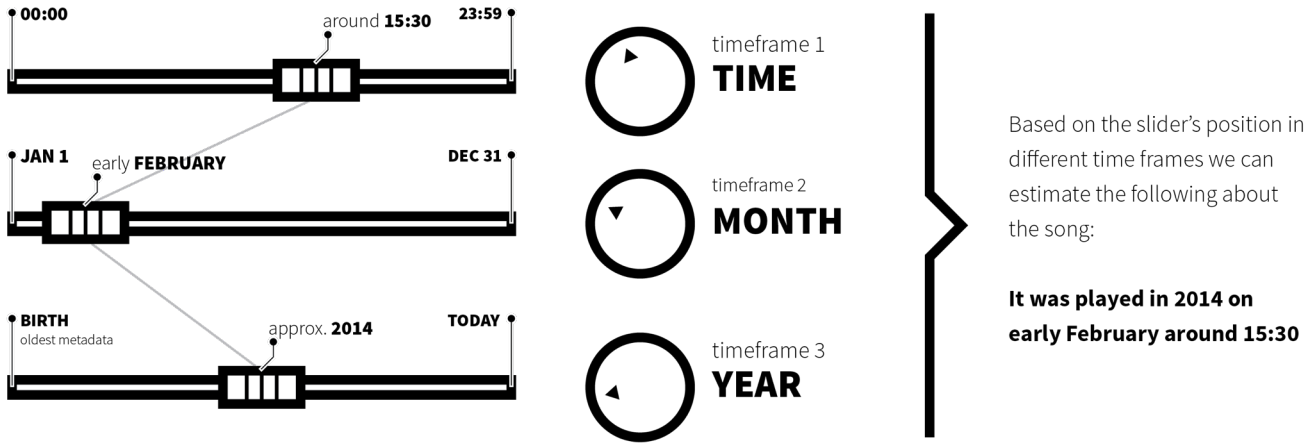

Figure 2. This illustration depicts the shifting position of a single metadata instance across the timeframe modes. Imagine the song begins playing in the *Year* timeframe; the user shifts to *Month* and then *Time* to curiously explore more about it as it continues playing.

critically investigate emerging and underexplored HCI research issues. Most recently, there is a growing call for HCI research that closely attends to the processes of creating design artifacts [11,13,14,12,24,27,43]. Collectively, this work highlights the need for more examples of design research to develop a foundation from which future methods and theories can be developed.

Our work modestly attempts to bring these different strands of research together. We want to investigate how technologies might be designed to embody alternative expressions of personal data that can support rich temporal experiences. We do this by grounding discussion around the design of a highly finished device that aims to make concrete new ideas for using metadata as a design material to support open-ended experiences with the lifetime of digital music a person has listened to.

DESIGN PROCESS AND IMPLEMENTATION

We designed OLO Radio to explore potential future interactions surrounding domestic technologies that manifest diverse expressions of personal data in everyday life. We wanted to create a technology that might contrast the utilitarian qualities of many everyday devices to give rise to more open-ended experiences of contemplation, curiosity, and enjoyment. We also aimed to create a design artifact that projected an enduring character and which manifested subtle changes over time. From a high level, our design attitude was influenced by several approaches including ludic design [17], reflective design [46], counter-functional design [43], and slow technology [19].

The development of OLO Radio consisted of the following. We reviewed theoretical literature, studies, and a range of design works. Similar to Schön's notion of design as a reflective conversation with materials [45], we engaged in a dialogue with theoretical, empirical, and design materials, and iterative development and critique of design concepts, to arrive at the OLO Radio design.

Developing our approach by working with the metadata

While we explored design ideas related to form, materials, and interaction in parallel, an important early decision was to develop working software that could capture, structure, and playback songs from a user's listening history metadata. OLO Radio works by linking to a user's Last.FM online account. Last.FM [57] is a free web-based application that runs across a user's personal computer, smartphone, and other peripherals to generate precise records of each song she has listened to in terms of the time and date, as well as the artist, song, and album (e.g., if listened through iTunes, Winamp, Spotify, Youtube, etc.). In existence since 2002, Last.FM offers deep, unprecedented access to its users' music listening histories.

We developed a Python script that generates a daily updated database of a user's entire metadata history of listening instances. We then implemented a Mopidy music server on a Raspberry Pi 3, and, via the Spotify API, used it to push a specific listening instance paired with a unique Spotify ID to a Spotify account dedicated to OLO Radio to subsequently play the song. By using a dedicated Spotify account, we avoided creating a feedback loop in which older entries were reintroduced into a user's actual Last.FM account metadata. In this way, OLO sits outside of the direct infrastructure of a user's music listening devices and services; it does not directly influence nor can it be controlled by any other service or device. Yet, one limitation in our implementation is that a user's Last.FM database has to be cross-referenced with the Spotify library and the songs that are not available must be excluded from the dataset. Nonetheless, Spotify offered the most accessible, robust, vast, and diverse music library available.

We then tested our software with various Last.FM accounts of existing users that had between 10,000-300,000 unique listening histories, most of which had been developed over a number or years or a decade. These user accounts were publically available and we selected them for their varying

size (Last.FM offers the option for users to have a private account). Through this process, it became clear that we needed to develop an approach to balancing the richness of each individual entry and the sheer scale of content, while keeping the design relatively simple and engaging.

We briefly contemplated simply playing a random song, yet this would provide little information about the particular time in one's life it came from. This triggered our next move which was to explore how we could structure the dataset in a more temporally evocative form. The timeline emerged as a recognizable metaphor that could easily enable direct manipulation. It appealed to us because, if constrained to a physical input mechanism like a sliding potentiometer, it would introduce a degree of imprecision as tens, if not hundreds, or thousands of songs are linearly navigated on a relatively small, circumscribed area. Yet, only representing the metadata in a linear order seemed underwhelming and unlikely to support a diverse range of curious, reflective, and emergent experiences over time.

This prompted us to explore how we could use the metadata of each listening instance as a resource to generate different ways of temporally and thematically organizing the content. We then conducted iterative experiments that involved developing queries to explore alternative metadata organizations and structures. This was, admittedly, a crude process. A user's Last.FM archive was typically vast and each unique entry in it offered various kinds of metadata related to the time and date in which a song was played as well as many aspects of the specific song (e.g., song title, artist, album, beats per minute, musical genre, related artists, etc.). As this was early in the design process, we desired to rapidly explore various combinations of different types of metadata in relation to each other (e.g., songs most played at certain times each year, over longer time periods, etc.). Yet, we often felt constrained by the cumbersome process of creating different metadata databases and then developing a way to speculate on how they might shape user experience. To enable a more flexible and fluid process, we eventually resorted to printing snippets of different metadata structures in paper spreadsheets and exploring different combinations side-by-side.

As a result of this process, we decided to focus largely on the temporal information (i.e., timestamps) offered by the Last.FM metadata. This presented a simple, yet a rich range of ways to explore themes in the digital music a user has listened to in the past. We then developed three distinct 'timeframe' modes for organizing a user's database that mapped well to a linear 'timeline-like' slider: *year, month,* and *time*; each are described from left to right in reference to the linear slider (see figure 2). *Year* organizes all listening instances in a timeline simply from oldest to most recent. *Month* organizes all instances based on the day and month each song was listened to, from January to December, to enable a different historical, perhaps even seasonal, way of listening to music from one's past. *Time* organizes all songs based on the specific time of day they were played, from 00:00 to 23:59, to open a space for exploring a trajectory of musical soundscapes, and potentially moods, that might shift over one day.

Balancing precision and imprecision in the design

A cornerstone of the OLO Radio design is that each metadata listening instance has a unique position on the slider for each timeframe mode. To realize this in practice required developing a technique to enable a user to shift between different timeframe modes. We iteratively developed an interaction design that involves a three-pole switch (in the form of a knob) and an actuated slider that, together, enables a user to shift between different timeframe modes in real-time, while the song continues to play. The metadata timestamp of the currently playing song acts as an anchor; if a user shifts to a different timeframe mode by turning the knob, the song continues playing as the slider automatically moves to the position 'in time' for the newly selected mode. Figure 2 offers an example illustration of where the slider would position a listening instance depending on the chosen timeframe; the gray lines are suggestive of the movement pattern that would occur if the timeframe knob turned from *time* to *month* to *year*. If the slider remains untouched, the next 'most recent' song in the queue based on the selected timeframe mode will play; this process will continue indefinitely. In this way, if left on and undisturbed, OLO Radio slowly moves forward in time, and while very subtly, the actuated slider also slowly moves in accordance. When a user moves the slider, a new song is selected and played based on the precise place it has been repositioned to on the linear continuum relative to the selected timeframe mode.

While OLO Radio leverages the precise metadata of each unique listening instance to enable a novel interaction design, its interface remains quite minimal. It offers no explicit information about the specific song being played or the overall archive itself. This decision makes the slider notably imprecise, opening up the possibility for a rich range of experiences to emerge. For example, such minimal feedback could trigger a user to reflect on when she had originally listened to the song; to contemplate the emotional texture evoked by the timbre of songs listened during different seasons over the years, or different times of the day; to inquisitively shift between timeframe modes as a song plays; or, simply, let the low hum of music from one's past reverberate against the backdrop of everyday life.

Listening to music can trigger a range of emotions, sensations, and thoughts that are shaped by and tied to our life experiences. Yet, such experiential outcomes are idiosyncratic, difficult to anticipate, and evolve over time. Our fundamental design decisions intentionally leverage relatively imprecise, minimal feedback to open a space for engendering a rich spectrum of experiences that can evolve and change as one develops a sensibility for 'reading', exploring, and living with OLO radio over time.

Technical Implementation and Temporal Matters

The finalized technical implementation of OLO Radio is split into two main parts. OLO's interaction and output

largely centers on the moving slider; for this we used a capacitive touch slider and affixed a capacitive knob onto it. We created a custom printed circuit board (PCB) that compactly included a capacitive touch chip, motor driver, and voltage regulator to interface with the Raspberry PI 3 and enable the slider to provide input and output as it is interacted with. A three-pole switch encased in a knob controls the timeframe mode; a similar looking potentiometer knob controls the on/off and volume (on the smaller right-most cabinet). We embedded a single LED near the volume knob, in between the white casing and steel body to indicate when OLO is turned on (see Figure 3.) The Raspberry PI 3 runs our custom software and a Mopidy music server for interfacing with Spotify for song playback; a HiFi Berry DAC+ Pro shield is mounted on the Raspberry PI to provide high quality audio output.

However, the process of transforming OLO Radio into a robust, highly finished design artifact capable of operating over long periods of time required us to attend to key temporal matters [c.f., 36]. First, we had to develop a way of organizing the potentially vast quantities of metadata into a data structure that would work on the actuated analog slider. While in theory there are 1024 unique points that can be sensed on the slider, iterative testing revealed we could unfailingly sense 1000 discrete locations. We then augmented our software to associate an array with each of the 1000 unique positions, and subsequently distributed a user's entire metadata archive evenly across the arrays for each of the three timeframe modes. Each array contains songs structured in a linear order such that the 'oldest' song for each respective timeframe mode will play first and then cycle through to the next in the queue. If the user moves the slider by touching it, the first song in the array of the discrete point it stops at will begin playing. When OLO is turned on, it will begin playing music associated with exactly where the slider is positioned in relation to timeframe mode and the locally stored metadata archive.

The process of updating OLO's metadata database from its user's Last.FM account occurs each time it is turned on. However, this happens as a background process; the update is only enacted after one song has finished and before the next begins to ensure it would only interrupt playback for a matter of seconds. In this way, time continues to shape OLO. As a user listens to digital music on her everyday devices (e.g., phone, laptop) and her Last.FM account slowly grows, the granularity of the slider slowly becomes lower as it spreads a growing archive over the 1000 discrete arrays. While it might be hard to detect the subtle changes day-to-day, they would become noticeable over the years, potentially prompting further creative explorations of OLO as the positioning of the music metadata on the slider for each timeframe mode slowly shifts over time.

Temporal matters related to longevity of use shaped other aspects of OLO's final implementation. We equipped the analog slider with a capacitive sensor to ensure that when resistance is applied to it (i.e. touched or actively moved), it is not possible to also change the timeframe mode by turning the three-pole switch knob. This decision helped safeguard the slider motor from being damaged. We also included an easily replaceable fuse between the 9V power source and Raspberry PI 3 to shield it from potential power spikes. Finally, the HiFi berry audio shield enabled OLO's audio signal to terminate to RCA female outputs, opening the possibility to connect it to a wide range of amplifiers, powered speakers, or wireless receivers. This opened up possibilities for using OLO in different domestic places and spaces over time without over-determining where it 'ought' to go. While perhaps seemingly lower-level details, these decisions importantly work together to express and embody an enduring quality and character. We aimed to anticipate potential consequences that come with everyday use and generate a sense of openness and ownership through living with (and potentially repairing) it in one's life over time.

Materials and Physical Form Design

OLO's physical form is comprised of steel rods, stained alder wood, and a white casing mounted on waterjet cut and bent sheets of 18-gauge steel. We chose these materials to give OLO the weight and feel of an enduring object capable of persisting as one's archive of listening histories grows and becomes more nuanced and in depth through time. The fusion of organic materials and modern style with emphasis on minimal and simple aesthetics exhibited in Finnish designer Alvar Aalto's pre-midcentury works (particularly his home and design studio [see 21]), also inspired our juxtaposition of wood tones, steel rods, and a white body.

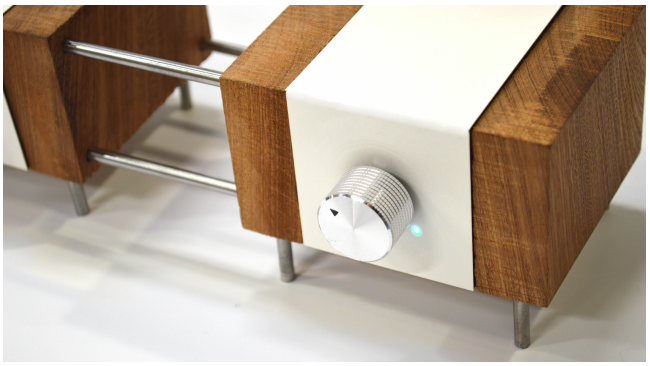

Figure 3. OLO Radio is turned on by rotating the right cabinet knob triggering a small LED to light up; further turning the knob adjusts the volume. Its materiality evoked a warm, lived-with quality, while balancing familiar and unfamiliar design elements.

We decided to create a physical separation between the control slider (Figure 1. left) and the volume control cabinet (Figure 3.) for a few key reasons. First, this distinction visually highlights the slider and nearby knob as the primary site for interaction. Second, it generates a sense of openness in the design that may subtly invite other domestic things to accumulate in, on, or around it over time, as it settles in as a fixture in one's everyday life. Third, these choices evoke a product design that references vintage stereo receivers, but departs from their form enough to suggest that OLO is a new kind of music listening device. In this way, OLO's minimal, yet rich form and material qualities evoke both the familiar and unfamiliar. At first glance, it projects the warm, recognizable qualities of

older audio technologies, while also inviting curious inspection and exploration over time.

DISCUSSION AND IMPLICATIONS

Developing approaches and strategies to design everyday technologies that express representations of digital data that meaningfully evolve and change over time presents important opportunities and issues for the HCI community. Through a critical reflection on our experiences as designer-researchers, we highlight challenges that come with this emerging space and insights into how they could be better grappled with in HCI research and practice.

Tools for working with metadata as a design material

Our design process highlighted a need for new interactive tools to support designers in working with metadata as a design material early in the design process. Our initial decision to create ad hoc software that generated raw databases of different user's Last.FM music metadata critically informed our design approach and, ultimately, our final design. Through iterative explorations we developed techniques for organizing users' Last.FM metadata archives in different temporal formats. This proved crucial to gaining a better grasp on how to conceptually and practically deal with the sheer size and scale of these dynamic datasets. However, early experiments in temporally organizing metadata archives were incredibly crude on a visual and tactile level. They were typically constrained to viewing an SQL database on a computer display or in snippets of printed paper spreadsheets. This slowed our efforts to develop a sensibility for understanding the temporal aesthetics of the metadata and the potential value that they might have for design. Ultimately, these efforts were worthwhile as they catalyzed our development of a slider-based interaction design that became a defining design element of OLO Radio.

As interaction designers increasingly aim to leverage metadata as a *design material* [18,38], there is an opportunity to develop new interactive tools that better support design teams in rapidly surfacing and prototyping different textures, patterns, and themes in large metadata archives. Similar to how our cumbersome early experiments eventually led to a novel interaction design, such tools could actively support the development of richer inspirational resources that can be scaffolded in the next stages of the design process. While numerous scientific data visualization tools exist, they are arguably not well suited for the rapid, often frenetic explorations that characterize actions early in the design process. Better supporting such practices will help designers develop a richer sensibility and intuition for working with large personal metadata archives and generate opportunities that better respond to the need to create rich, diverse alternative expressions of personal data in everyday life [8,9]. We imagine work in HCI that has begun to develop initiatives to support designers in getting a grasp on the immateriality of software, data, and algorithms [6,42] could be leveraged in support of future research in this direction, as could the broader trajectory of work on developing tools for designers [e.g., 35,50].

Making use of metadata for open-ended experiences

OLO Radio's defining quality is its minimal character, which is made concrete across its interaction design, physical form, and material aesthetics. Fundamental to our goal of supporting open-ended experiences over time is the 'imprecise' feedback OLO communicates about any given song being played as well as the broader music archive itself. Interaction metaphors offering total control over music selection, whether inspired by traditional physical music media (e.g., thumbing through a stack of records) or digital music media (e.g., serially scrolling through a discrete screen-based list of songs), were equally unfeasible given the sheer scale of unique metadata instances exhibited in Last.FM user accounts.

Prior HCI research has shown how randomness can operate as a resource to catalyze engaging experiences with reasonably large archives of personal digital media [30,37,52]. Yet, in our case, subverting all user control by playing a randomly selected song would fail to leverage the precise temporal information that metadata can offer as a rich design material. From a user perspective, implementing a purely random approach would have rendered each unique metadata listening instance to be experienced as simply a song that was played at 'some time' in one's past, with no reference to when it may have occurred.

The exacting precision afforded by Last.FM's metadata is precisely what enabled us to develop a novel interaction design that offered a user total control over the system, while providing minimal feedback about its relation to her past. Key to our approach was the combined use of a linear slider as an input mechanism to explore songs at different points in one's past with a knob to shift between different timeframe modes, which made the actuated slider also a subtle output mechanism. This enables a user to explore and shift the temporal location of a single instance (i.e., the currently playing song) across linear (i.e., *year*) and nonlinear (i.e., *month* and *time*) temporal representations.

In addition to offering multiple representations of time to retrospectively experience one's archive, OLO Radio also changes through time. If left on and undisturbed, the slider very slowly moves forward as the listening entries slowly advance ahead in time. Equally, as a user's everyday digital music listening practices continue and their Last.FM archive grows, the granularity of the slider gradually decreases as music metadata slowly stacks up in arrays tied to each of the discrete slider positions. In this way, OLO Radio subtly changes through prolonged use or simply as it ages and acquires new listening histories from its user's spectrum of prior and ongoing music listening practices.

OLO Radio makes concrete an approach to designing technologies that express and offer engagement with multiple temporal representations of one's personal data, which subtly and gradually shift and change with the user. The minimal interface, interaction, and feedback generate an experiential quality that, by design, invites engagement over time. The physical form and materiality reinforce the enduring quality of this device, and its potential to support a

wide set of open-ended, lived-with experiences on one's own time. We see each of these dimensions of OLO's design as important qualities that can productively work together to enable the meaningful fit of large and growing amounts of personal data among the practices, things, places, and people that construct everyday life.

CONCLUSIONS AND FUTURE WORK

Through grounding our research in the creation of a highly finished design artifact, our work contributes concrete insights into a design approach that responds to growing calls in HCI to design technologies capable of: (i) sustaining longer-term experiences [19,33], (ii) opening new possibilities for forming relations to our personal data in everyday life [8,51], and (iii) expressing more diverse perspectives on temporality through design [32,44,54]. Insights from our design process revealed the practical need for richer, more expressive tools to support interaction designers in making use of metadata archives as a design material early in the exploratory stages of the design process. Our work also suggests opportunities for future HCI research to design new ways of temporally organizing, manifesting, and engaging with other forms of personal content and their attendant metadata (e.g., photos, video, digital messages, etc.) in everyday life. Beyond personally generated content, this approach could equally help extend nascent and growing design efforts exploring how dynamic ready-made data (e.g., related to climate [26], seismic [47], or transportation patterns [16]) could be meaningfully situated in people's everyday lives over time.

Importantly, our aim is not to be prescriptive or conclusive. Rather, we intend to unpack the OLO Radio design artifact in the service of inspiring and framing future design-oriented work inquiring into the role, place, and pace of digital data in everyday life. In our future work, we aim to produce low-volume productions of OLO Radio to explore people's experiences with it over time in their everyday lives. On a broader level, we hope that our detailed unpacking the design of OLO Radio and discussion of the resulting implications can be appreciated as an effort to better support design-oriented forms of knowledge production in the HCI community.

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