SOCIAL MUSIC IN CARS

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Wayne: "I think we'll go with a little Bohemian Rhapsody, gentlemen"
Garth: "Good call"
Wayne's World (1992)

ABSTRACT

This paper builds an understanding of how music is currently experienced by a social group travelling together in a car—how songs are chosen for playing, how music both reflects and influences the group's mood and social interaction, who supplies the music, the hardware/software that supports song selection and presentation. This fine-grained context emerges from a qualitative analysis of a rich set of ethnographic data (participant observations and interviews) focusing on the experience of in-car music on moderate length (30 minutes to 2 hours) and longer trips (2+ hours). We suggest features and functionality for music software to enhance the social experience when travelling in cars.

1. INTRODUCTION

Automobile travel occupies a significant space in modern Western lives and culture. The car can become a 'home-from-home' for commuters in their largely solitary travels, and for groups of people (friends, families, work colleagues) in both long and short journeys [17]. Music is commonly seen as a natural feature of automotive travel, and as cars become increasingly computerized [14] the opportunities are increased for providing music tailored to the specific characteristics of a given journey. To achieve this goal, however, we must first come to a more fine-grained understanding of these car-based everyday music experiences. To that end, this paper explores the role of music in supporting the 'peculiar sociality' [17] of car travel.

This paper is organized as follows: Section 2 describes previous research on the interactions between car travelers/drivers and music, and music and driving safety. Section 3 describes the gathering of the ethnographic data: 28 participant observations of social music behavior during car trips, and 4 interviews that included the informants' perspectives on music when traveling. Section 4 summarizes the patterns of music-related behaviors exhibited in the ethnographic data, and Section 5 explores design implications arising from that behavior for a car-based social audio system.

2. BACKGROUND

Most work investigating the experience of music in cars focuses on single-users, (e.g. [4], [5]). Solo drivers are free to create their own audio environment: "the car is a space of performance and communication where drivers report being in dialogue with the radio or singing in their own auditized/privatized space" [5]. Walsh [18] notes that "a large majority of drivers in the United States declare they sing aloud when driving".

Walsh provides the most detailed discussion of the social aspects of music in cars, noting the interaction with conversation (particularly through volume levels) and music's role in filling "chasms of silence" [18]. Issues of impression management ([18]; [21]) (music I like but wouldn't want others to know I like) are more acute in the confined environment of a car and vary depending on the social relationships between the occupants [18]. Music selections are often the result of negotiations between the passengers and the driver ([11], [18]), where the driver typically has privileged access to the audio controls.

Bull [6] reports a particularly interesting example of the intersection between the private environment of personal portable devices and the social environment of a car with passengers:

> Jim points to the problematic nature of joint listening in the automobile due to differing musical tastes. The result is that he plays his iPod through the car radio whilst his children listen to theirs independently or playfully in 'harmony' resulting in multiple soundworlds in the same space:

Here, although the children have personal devices they try to synchronise the playback so that they can experience the same song at the same time; even though their activity will occur in the context of another piece of music on the car audio system. Alternative methods for sharing include explicit (and implicit) recommendation, as in *Push!Music* [12], and physical sharing of earbuds [3]. Bull [6] also highlights another aspect of music in cars: selection activi-

ties that occur prior to a journey. The classic 'roadtrip' activity of choosing music to accompany a long drive is also noted: "drivers would intentionally set up and prepare for their journey by explicitly selecting music to accompany the protracted journey "on the road"" [18].

Sound Pryer is a joint-listening prototype that enables drivers to 'pry' into the music playing in other cars. This approach emphasises driving as a social practice, though it focuses on inter-driver relationships rather than those involving passengers. *Sound Pryer* can also be thought of as a transfer of some of the mobile music sharing concepts in the *tunA* system [2] to the setting of cars.

Driver distraction is known to be a significant factor in vehicle accidents and has led to legislation around the world restricting the use of mobile phones whilst driving. In addition to distraction effects caused by operating audio devices there are the separate issues of how the music itself affects the driver. Driving style can be influenced by genre, volume and tempo of music in the vehicle [7]: "at high levels, fast and loud music has been shown to divert attention [from driving]" [8], although drivers frequently use music to relax [8]. Several reports indicate that drivers use music to relieve boredom on long or familiar routes ([1], [18]), e.g. "as repetitious scenery encourages increasing disinterest … the personalized sounds of travel assume a greater role in allowing the driver-occupants respite via intermitting the sonic activity during protracted driving stints" [18].

Many accidents are caused by driver drowsiness; when linked with physiological sensors to assess the driver's state, music can be used to assist in maintaining an appropriate level of driver vigilance [13–]. Music can also counteract driver vigilance by masking external sounds and auditory warnings, particularly for older drivers where age-related hearing loss is more likely to occur [16].

In summary, music fulfils a variety of different roles in affecting the mental state of the driver. Music competes and interacts with passenger conversation, the external environmental and with audio functions from the increasingly computerised driving interface of the car. When passengers are present the selection and playing of music is a social activity that requires negotiation between the occupants of the vehicle.

3. DATA COLLECTION AND METHODOLOGY

Our research uses data collected in a third year university Human Computer Interaction (HCI) course. This course adopts the 'practical approach' to incorporating ethnography into software design. Students work individually over the semester to design and prototype a system based around the given focus application, where their designs are informed by a series of ethnographic investigations into behavior associated with the application domain.

This present paper focuses on the ethnographic data collected that relates to music and car travel, as gathered by twenty-two student investigators (Table 1). To explore the problem of designing a system to support groups of people in selecting and playing music while traveling, The students performed participant observations, with the observations focusing on how the music is chosen for playing, how the music fits in with the other activities being conducted, who supplies the music, and how/who changes the songs or alters the volume. The students then explored subjective social music experiences through auto-ethnographies [20] and interviews of friends. The data comprises nineteen participant observations, two self-interviews, and four interviews.

Table 1. Demographics of student investigators

Male	Female	National Origin	Count
17	5	NZ/Australia	5
		China	13
Age Range:		Mid-East	3
20 - 27		Other	1

Of the nineteen participant observations, four were of short drives (10 to 30 minutes), fourteen were lengthier trips (50 minutes to 2 hours), and one was a classic 'road trip' (7 hours). The number of people participating in a trip ranged from one to five (Table 2). Of the 69 total travelers across the nineteen journeys, 45 were male and 24 were female. One set of travelers were all female, seven were all male, and the remainder (eleven) were mixed gender.

Table 2. Number of travelers in observed journeys

1	**2**	**3**	**4**	**5**
7	0	7	7	4

Grounded Theory methods [2] were used to analyze the student summaries of their participant observations and interviews. With Grounded Theory, a rich picture of the activity and its underlying structures emerge through an inductive, open coding of the ethnographic data. This present paper teases out the social behaviors that influence, and are influenced by, music played during group car travel. Supporting evidence drawn from the participant observations and interviews are presented below in italics.

4. MUSIC BEHAVIOR IN CAR TRAVEL

This section looks at: the physical car environment and the reported car audio devices; the different reported roles of the driver; observed behaviors surrounding the choice of

songs and the setting of volume; music and driving safety; ordering of songs that are selected to be played; and the 'activities' that music supports and influences.

4.1 Pre-trip Activities

The owner of a car often keeps personal music on hand in the vehicle (CDs, an MP3 player loaded with 'car music') as well as carrying along a mobile or MP3 player loaded with his/her music collection). If only the owner's music is played on the trip, then that person should, logically, also manage the selection of songs during the journey. Unfortunately the owner of the car is also often the driver as well—and so safety may be compromised when the driver is actively involved in choosing and ordering songs for play.

Passengers are also likely to have on hand a mobile or MP3 player, and for longer trips may select CDs to share. If two or more people contribute music to be played on the journey, the challenge then becomes to bring all the songs together onto a single device—otherwise they experience the hassle of juggling several players. A consequence of merging collections, however, is that no one person will be familiar with the full set of songs, making on-the-road construction of playlists more difficult (particularly given the impoverished display surface of ~~by~~ most MP3 players).

A simple pooling of songs from the passengers' and driver's personal music devices is unlikely to provide an efficiently utilizable source for selection of songs for a specific journey. The music that an individual listens to during a usual day's activities may not be suitable for a particular trip, or indeed for any car journey. People tend to tailor their listening to the activity at hand [22], and so songs that are perfect 'gym music' or 'study music' may not have the appropriate tempo, mood, or emotional tenor. Further, an individual's music collection may include 'guilty pleasures' that s/he may not want others to become aware of [21]:

> *What mainly made [him] less comfortable in providing music that he likes is because he did [not] want to destroy the hyper atmosphere in the car as a result of the mostly energetic songs being played throughout the trip. His taste is mostly doom and death metal, with harsh emotion and so will create a bleak atmosphere in the car. Also, the songs he enjoys contain rather controversial subjects, such as religion and warfare, and he's worried that they might disturb his friends and make them think he is insane.*

4.2 Physical Environment and Audio Equipment

The travel described in the participant observations primarily occurred in standard sized cars with two seating areas, comfortably seating at most two people in the front and three in the rear sections. In this environment physical movement is constrained. If the audio device controller is fixed in place then not everyone can easily reach it or view its display; if the controller is a handheld device, then it must be passed around (and even then it may be awkward to move the controller between the two sections).

As is typical of student vehicles in New Zealand, the cars tended to be ten years or older and as such were less likely to include sophisticated audio options such as configurable speakers and built-in MP3 systems. The range of audio equipment reported included radio, built-in CD player, portable CD player, stand-alone MP3 player plus speakers, and MP3 player connected to the car audio system.

Comment [D1]: Anonymize? "in the country of study"

The overwhelming preference evinced in this study is for devices that give more fine-grained control over song selection (i.e., MP3 players over CD players, CD players over radio). The disadvantages of radio are that music choice is by station rather than by song, reception can be disrupted if the car travels out of range, and most channels include ads. On the other hand, radio can provide news and talk-back, to break up a longer journey.

4.3 Music in Support of Journey Social Activities

Music is seen as integral to the group experience on a trip; it would be unacceptable and anti-social for the car's occupants to simply each listen to their individual MP3 player, for example. We identify a wide variety of ways that travelers select songs so as to support group social activities during travel:

- Music can contribute to driving **safety**, by playing songs that will reduce driver drowsiness and keep the driver focused (*music… can liven up a drive and keep you entertained or awake much longer*). For passengers, it can reduce the tedium associated with trips through uninteresting or too-familiar scenery (*music can reduce the boredom for you and your friends with the journey*). Conversely, loud, fast tempo music can adversely affect safety ([As the driver, I] *changed the volume very high… my body was shaking with the song. I stepped on the accelerator in my car; The driver [was] seen to increase the speed when the songs he liked is on*).
- Listening to music can be the main source of **entertainment** during a trip, as the driver and passengers focus on the songs played.
- Songs need not be listened to passively; travelers may engage in **group sing-alongs**, with the music providing support for their 'performances'. These sessions may be loud and include over-the-top emotive renditions for the amusement of the singer and the group, and be accompa-

nied by clapping and 'dancing' in the seats (*The participants would sing along to the lyrics of the songs, and also sometimes dance along to the music, laughing and smiling throughout it*).

- A particular song may spark a **conversation about the music**—to identify a song (*they would know what song they wanted to hear but they would not know the artist or name of the song. When this happened, they would … try to think of the artist name together*) or to discuss other aspects of the artist/song/genre/etc (*'In the air tonight, Phil Collins!' Ann asked Joan and I, 'did you know that it's top of the charts at the moment' which Joan replied, 'but it's old as' and Ann said, 'yeah he re-released it'. There was conversation about Phil Collins re-releasing his music.)* A lively debate can surround the choice and ordering of the songs to play, if playlists are created during the trip itself.
- Music can provide a **background to conversation**; at this point the travelers pay little or no attention to the songs but they mask traffic noises (*when we were chatting… no one really cared what was on as long as there was some ambient sound*). By providing a 'filler' for awkward silences, music is particularly useful in supporting conversations among groups who don't know each other particularly well (*it seemed more natural to talk when there was music to break the silence*).

For shorter trips, music might serve only one or two of these social purposes—playing as background to a debate over where to eat, for example. On longer journeys, the focus of group attention and activity is likely to shift over time, and with that shift the role of the music will vary as well: *At some times it would be the focus activity, with everyone having input on what song to choose and then singing along. While at other times the group just wanted to talk with each other and so the music was turned right down and became background music…*

4.4 Selecting and Ordering Songs

The physical music device plays a significant role in determining who chooses the music on a car trip. If the device is fixed (typically in the center of the dashboard), then it is easily accessible only by the driver or front passenger—and so they are likely to have primary responsibility for choosing, or arbitrating the choice, of songs. The driver is often the owner of the vehicle, and in that case is likely to be assertive at decision points (*Since I was the driver, I was basically the DJ. I would select the CD and the song to be played. I also changed the song if I didn't like it even if others in the car did.*). Given the small display surfaces of most music devices and the complexity of interactions with those devices, it is likely that safety is compromised when the driver acts as DJ. Consider, for example:

> *I select some remixed trance music from the second CD at odd slots of the playlist, and then insert some pop songs from other CDs in the rest of the slots of the list. … I manually change the play order to random. Also I disable the volume protect. And enable the max volume that from the subwoofer due to the noises from the outside of my car …*

If the music system has a hand-held controller, then the responsibility for song selection can move through the car. At any one point, however, a single individual will assume responsibility for music management. Friends are often familiar with each others' tastes, and so decisions can be made amicably with little or no consultation (*I felt comfortable in choosing the music because they were mostly friends and I knew what kind of music they were all into and what music some friends were not into…*). Imposing one's will might go against the sense of a group experience and social expectations *(…having the last word means it could cause problems between friends*), or alternatively close ties might make unilateral decisions more acceptable (*I did occasionally get fed up from their music and put back my music again without even asking them for permission, you know we are all friends.*).

As noted in Section 4.1, song selection on the fly can be difficult because the chooser may not be familiar with the complete base collection, or because the base collection includes songs not suited to the current mood of the trip. A common strategy is to listen to the first few seconds of a song, and if it is unacceptable then to skip to the song that comes up 'next' in the CD / shuffle / predetermined playlist. This strategy provides a choppy listening experience, but does have the advantage of simplicity of execution: a song is skipped if any one person in the car expresses an objection to it. It may, however, be awkward or embarrassing to

ask for a change if one is not in current possession of the control device.

Song-by-song selection is appropriate for shorter trips, as the setup time for a playlist may be longer than the journey itself. Suggesting and ordering songs can also be a part of the fun of the event and engage travelers socially (*My friends would request any songs that they would like to hear, and the passenger in control of the iPod acted like a human playlist; trying to memorise the requests in order and playing them as each song finished.*)

For longer trips, a set of pre-created playlists or mixes (supporting the expected moods or phases of the journey) can create a smoother travel experience. A diverse set of playlists may be necessary to match the range of social music behaviors reported in Section 4.2. Even with careful preplanning, however, a song may be rejected at time of play for personal, idiosyncratic reasons (for example, one participant skips *particular songs … associated with particular memories and events so I don't like to listen to them while driving for example*).

4.5 Music Volume

Sound volume is likely to change during a trip, signaling a change in the mood of the gathering, an alteration in the group focus, or to intensify / downplay the effects of a given song. Participant observations included the following reasons for altering sound levels:

- To focus group attention on a particular song (louder)
- For the group to sing along with a song (louder)
- To switch the focus of group activity from the music to conversation (softer)
- To 'energize' the mood of the group (louder)
- To calm the group mood, and particularly to permit passengers to sleep (softer)
- To move the group focus from conversation back to the music, particularly when conversation falters (louder)

Clearly the ability to modulate volume to fit to the current activity or mood is crucial. A finer control than is currently available would be desirable, as often speaker placement means perceived volume depends on one's seat in the car (*[he] asked the driver to turn the bass down … because the bass effect was too strong, and the driver … think[s] the bass is fine in the front*).

Further, the physical division of a car into separate rows of seats and its restriction of passenger movement can encourage separate activity 'zones' (for example, front seats / back seats)—and the appropriate volume for the music can differ between seating areas:

> *One of our friends who sets beside the driver is paying more attentions on the music, the rest 3 of us set in the back were communicate a lot more, and didn't paying too much attention on the music. I think this is because the front people can hear the music a lot more clear then the people sets in the back, and it's harder for the front people to join the communication with the back people because he need to turn his head around for the chat sometimes.*

5. IMPLICATIONS FOR A SOCIAL AUDIO SYSTEM FOR CAR TRAVEL

Leveraging upon music information retrieval capabilities, we now describe how our findings can inform the design of software specially targeted for song selection during car trips—personified, the software we seek in essence acts as a music host. In general a playlist generator [9] for song selection coupled with access to a distributed network of self-contained digital music libraries for storing, organizing, and retrieving items [19] (the collections of songs the various people travelling have) are useful building blocks to developing such software; however, to achieve a digital music host, what is needed ultimately goes beyond this.

In broad terms, we envisage a software application with two phases: initial configuration and responsive adaptation. During configuration, the application gathers preferences from individuals, such as do they enjoy singing along to a song, are there any songs they wish to keep private, or any of the other behaviors noted in Section 4. The collated responses are then used by the software application to generate an initial playlist.

During the trip, the application makes use of a variety of inputs to dynamically adjust the sequence of songs played. Here significant gains can be made from the use of MIR techniques. The response to inputs could vary from the prosaic use of individuals wirelessly voting (using their smart phones) the currently playing item up or down as an expression of like/dislike (relevance feedback), to more inventive uses of temporal and spatial information, even data sensors from the car. For instance, if the application noticed the car was going above the speed limit for that section of road (GPS) it could alter the selection of the next song to one that is quieter with a slower tempo (beat detection); alternatively, triggered by the detection of the conversation lapsing into silence (noise cancelling) the next song played could be altered to be one labeled with a higher "interest" value (~~sourced from~~tagged, for instance, using semantic web technologies, and captured in the digital mu-

sic library as metadata). News sourced from a radio signal (whichever is currently in range) can be interspersed with the songs being played.

Either of the software phases is optional depending on the final media format used to deliver the music, and the forms of media players the individuals have. If the only means to play audio in the car is a CD player, then the configuration phase needs to be prepared in advance using a desktop PC—syncing with other individuals' ~~media players~~ music collections wirelessly or in disk mode—and burning the resulting CD-image to disk. In this scenario the second phase (responsive adaptation) in not used. At the other extreme, if all the media players are smart phones then the configuration phase is optional. The starting play list can be primed to select songs in a round-robin fashion between the difference devices, with information being entered asynchronously during the trip from the phones (such as a user's preferences, and voting) used to dynamically adjust the decision making process of the digital music host.

As evidenced by our analysis, the role of the driver/owner of the car takes on special significance in terms of the software design. As the host of the vehicle, there is a perception that they are more closely linked to the software (the digital music host) that is making the decision over what to play next. While it is not a strict requirement of the software, for the majority of situations it will be an instinctive decision that the key audio device used to play the songs on the trip will be the one owned by the driver. For the adaptive phase of the software then, there is a certain irony that the driver (for reasons of driving safely) has less opportunity to influence the song selection during the trip. To address this imbalance, an aspect the software could support is the prioritization of input from the "master" application at noted times that are deemed safe (such as the car is stationary as the result of being at traffic lights).

Reflecting on our analysis above of social music behaviors when travelling by car, the structure to the software we have described here would support many of these social interactions. Allowing multiple "server hosts" to co-exists in the car on smart phones would even allow for the earlier example of the children in the backseat choosing to listen in unison (through their headphones) a different song sequence to the driver.

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