The Force Dynamic Structure of the Phonographic Container: How Sound Engineers Conceptualise the 'Inside' of the Mix

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Abstract

The continuous development of new recording technologies and recording practices has had considerable impact on how popular music recordings are produced; yet our ability to articulate the impact of these technologies on the perception of sounds is limited. To describe what has been done to sounds in the mix often requires sound engineers to draw metaphorical comparisons with other experiences. Until now few scholars have studied the language of sound engineers. This article is based on a survey of metaphorical expressions used in interviews with sound engineers. The survey showed that sounds and sound effects are often described as forceful objects that *act* and *interact* in the mix. This interaction is characterised through expressions such as: the sound was 'pulled back' in the mix; the compressor was 'holding down' the sound; and the vocals were 'pushed up front'. Using cognitive linguistic theory as a guide, this article argues that sound engineers' use of force dynamic metaphors offers a better understanding of the structure and manifestation of recorded sound and the impact of record production on the listening experience.

1. Introduction

Recordings of musical performances are clearly aesthetically different from the sounds of acoustic instruments heard in real-world environments. Recording equipment and post-production effects, such as reverbs, delays, equalisation and compression, allow recording engineers to modify recorded sounds in creative ways into auditory phenomena aesthetically distinct from real-world sounds. Yet, as Jay Hodgson (2010) notes, the musical effect of recording technologies on the listening experience is often conspicuously absent from most analytical studies of music.

Musicologists have studied record listening in an impressive number of ways, obtaining great insight into how listeners attend to and extract meaning from recorded music. Music listening may, for instance, involve attending to the perceived intentions of the songwriter, feeling moved by the perceived bodily gestures of musicians or appreciating the more formal structures of the musical material (e.g., harmony, melody and rhythm) (Frith 1998). Adding to the findings of such studies I find that further attention should be given to the *activity* of sounds within the recorded material itself.

Since the late 1990s musicologists have been increasingly concerned with music recordings, a field Steven Cottrell (2010) has termed phonomusicology. In recognising record-making as an art form this field seeks to trace the influence of recording practices on, for instance, the listening experience. There are several difficulties, however, with such studies. First, music researchers analysing recorded music have usually not experienced the 'performances' in the recording studio that were later spliced together and processed to form the final track. For this reason they do not have the before-and-after perspective that allows them to judge what actually changed in the recording process. Second, even researchers who do have knowledge about the production practices behind a particular recording find that limitations of language often make it difficult to articulate what happened to the sound during the studio sessions. For this reason we still know little about how recording practice and audio effects change our perception of recorded music. The question remains as to which kinds of new layers of meaning are added in the recording and post-production process and how we should describe these extra layers. Seeking to answer such questions, this article presents the results of a study examining how sound engineers represent the sound of recording technologies in language. The approach seeks to probe the before-and-after perspective of recordings, opening up an alternative view on the variety of ways in which different qualities of sound can change the experience of recorded music.

1.1 Conceptualising Sound

A number of scholars have studied language about music from different perspectives. Lawrence Zbikowski (2002) presented one of the most comprehensive studies of how music is understood and conceptualised in his book *Conceptualizing Music*. Building on cognitive linguistic theory he argues that the cognitive processes we use to understand music are not unique capacities for music understanding, but the same capacities through which we structure all experiences in our everyday life. Zbikowski's book contributes greatly to the understanding of notation-based music. It is, however, not concerned with non-notational experiences that may arise more from different qualities of sound, such as timbral and spatial characteristics. Morten Michelsen (1997) accounts for these experiences of sound (e.g., timbre and space) in his study of how academics and music reviewers use metaphors to express their experience of musical sounds. Michelsen argues that sounds are not necessarily experienced as complex phenomena. The complexity arises because our common language does not allow us to describe these phenomena precisely. For this reason metaphors are necessary conditions for all language about sound. In Michelsen's research and other related studies the language of sound engineers and other music production professionals is only touched upon very briefly, or not at all. One notable exception is the American anthropologist Thomas Porcello's (2004, 2005) studies of dialogue between recording engineers in the recording studio. In his 2004 article, "Speaking of Sound: Language and the Professionalization of Sound-Recording Engineers", Porcello explores the different linguistic resources which such sound engineers make use of in their search for *the right* sound. Porcello's work offers important suggestions regarding how a focus on speech about sound could enrich our understanding of sound engineering practice. Whereas Porcello, however, finds metaphorical descriptions of sound inherently vague, my study embraces these metaphors as a means to access how sound engineers think and respond to recorded sounds in the mix process.

Sound engineers are a specific category of specialised listeners. They distinguish themselves from most other musicians and composers by their primary focus on getting *the right* sound over other parameters of musical expression. For this reason they are not just good at deciphering complex sound phenomena. They are also acquainted with the techniques used to make the sounds. Consequently they may listen more for the techniques *behind* the music than to the music *itself*. We can call this type of listening *recipe listening* (Landy 2007: 97) or *technological listening* (Smalley 1997: 109). Second, sound engineers are not just specialised listeners. They are also authors of the mix and have to some extent an idiosyncratic language for conceptualising what they do. Sound engineers are accustomed to certain ways of talking about sound and thus use much more elaborate metaphors than most other listeners.

1.2 Scope of the Article

This article explores the use of metaphors in sound engineers' evaluation of their work. I start by outlining the notion of the *phonographic container*, which is used to define the phenomenal frame in which recorded sounds appear. I then proceed to analyse the results of a survey of sound engineers’ language. This survey is based on six textbooks for sound engineers (Alten 2011; Bartlett & Bartlett 2009; Bregitzer 2009; Gibson 2005; Izhaki 2008; Owsinski 1999), 20 interviews with sound engineers published in Bobby Owsinski’s *The Mixing Engineers Handbook* (1999) and 35 interviews with sound engineers conducted by Paul Tingen and published *in Sound on Sound Magazine* (January 2007 to November 2009, one interview in every monthly issue). The textbooks, as well as the interviews, centre on a variety of different approaches to recording and mixing. In this article I will particularly focus on how the impact on dynamic range compression is conceptualised. This focus was chosen because I found a very elaborate use of metaphors in the interviews whenever dynamic range compression was discussed. It also serves to narrow down an otherwise quite complex field.

The analysis of the interviews is concerned with how sound engineers tend to describe sounds as entities that *act* and *interact* in the phonographic container. These descriptions point to how sound engineers often use force dynamic metaphors (Talmy 1985) when describing what is going on in their mix. This finding, I claim, will provide music researchers with new insights into the structure and manifestation of recorded sounds and offer new ways to understand the impact of record production on the listening experience.

2. Methodology

My argument rests on cognitive linguistic theory as it has evolved from the work of George Lakoff and Mark Johnson (1980), who describe how perceptual domains are structured by projecting patterns of experience from one domain to another. Studying metaphorical expressions, they sought to explain human meaning and the embodied origins of imaginative structures. The latter is described further under the heading *image schemas* introduced simultaneously in Johnson's *The Body in the Mind* (1987) and Lakoff's *Women, Fire and Dangerous Things* (1987).

Inspired by the Kantian notion of *imagination* Johnson (1987) describes image schemas as gestalt structures that consist of *parts* that are organised into unified *wholes*. Kant suggested that concepts of understanding and intuitions were connected through a *transcendental schema*. This schema is what structures our awareness of objects, by 'sketching out' possible applications of the concept. Likewise image schemas are characterised as abstract structures of recurring patterns of embodied experience that are *activated* through experience. These patterns may then organise more abstract understanding. We should acknowledge, however, the possible bias towards visual perception implied by the word 'image'. Image schemas are here understood in a broader sense as a function of all sensory experiences. These schemas emerge from our bodily experiences in everyday life and are thus closely tied to our perceptual capacities and bodily motor skills. For this reason we can see image schemas as embodied schemas that form the basis for perception, thought and language. Since language is based on the same conceptual system as that governing how we both think and act, we can gain access to the workings of this system by studying how we speak about certain phenomena.

3. The Phonographic Container

CONTAINMENT (Johnson 1887; Lakoff & Johnson 1999) is a central schema that structures our conceptualisation of experience in everyday life as well as in music. The schema (Figure 1) is activated when we experience events where something is located within another thing. Such events usually have an inside and an outside, as well as a boundary between them.

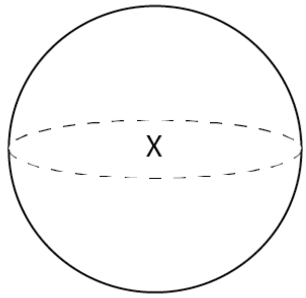


Figure 1: CONTAINMENT schema

When talking about recorded sounds, CONTAINMENT is a prevalent and established metaphor. We say that sounds and sound sources are *in* the recording, although no substantial entities reside in the medium but only different kinds of audio representations (e.g., grooves in records or ones and zeroes on CDs) that can reproduce auditory phenomena. We simply impose a CONTAINMENT schema on the recording. In the studied interviews with sound engineers the CONTAINMENT schema was often activated in their description of their mix, e.g., when they were talking about sounds *in* the mix, *in* the track or *in* the recording. But what does it mean that a sound is *in* the track, *in* the recording or *in* the mix?

On closer examination of the interviews it became apparent that sounds and sounds effects are often described in terms of how they act *in,* and *in relation to,* the phonographic container (my italics in all):

- There were a lot of things playing … but it made the track too *full*. (Renaud Letang *in* Tingen 2008, Apr.)
- If you use 96k you have all these frequencies above our hearing range that *just eat up headroom*. (Jacquire King *in* Tingen 2008, Dec.)
- I needed a longer reverb to *fill in spaces*. (Jason Goldstein *in* Tingen 2007, Apr.)
- You have these moments *in* the track where it is *open* and soaring and where the big reverbs *open all the floodgates*. (Chris Lord-Alge *in* Tingen 2007, May)
- [The sound] *jumps out* of the track too much. (Joe Chiccarelli *in* Tingen 2007, Oct.)
- Every time the kick *hits* [the compressor] *ducks* the bass track 2-3 dB to *give space* for the kick. (Fraser T. Smith *in* Tingen 2009, Nov.)

- I really start searching out the frequencies that are *clashing or rubbing against each other*. (Jon Gass *in* Owsinski 1999: 31)
- Then I'll do some frequency juggling so that everybody is *out of everybody else's way*. (Ed Seay *in* Owsinski 1999: 164)
- … It was one of these tracks that could easily have sounded way too *crowded*. (Manny Marroquin in Tingen 2007, Dec.)
- Instead of *occupying* a small spot *in the middle of the mix*, I could *fill* the whole spectrum. (David Pensado *in* Tingen 2007, Jan.)

As we can see from these quotes, sound engineers often conceptualise the inner workings of the mix by mapping agency onto sound and sound effects, e.g., "jump out", "eat up", "rubbing against each other" and "Every time the kick *hits* [the compressor] *ducks* the bass". Also we can see how the mix is conceptualised as a spatial container with *dimensions* that have relative and absolute *positions*. Sounds *take up space* within the recording, and sounds can potentially *get in the way* of each other. Each of the quotes describes different 'states' of the phonographic container and its content, for instance, the absolute position of sounds (e.g., *in the middle of the mix*), the relative position of sounds (e.g., *rubbing against each other*) or the *internal state* (e.g., *crowded*).

4. From Static to Force Dynamic Metaphors

We think of spatial language in terms of our bodily perspective rather than as a geometrical structure. Spaces are 'expressive' in several ways. Likewise, hearing is not a static phenomenon. When we say that a sound is *in* the mix we categorise a sound phenomenon. But meaning does not arise from this categorisation. It is conveyed by the sound of the physical signal through the perceptual process of listening (cf. Griffith 2002). Thus, when we use metaphors we risk objectifying sound phenomena, reducing them to static phenomena and thereby failing to represent their meaning (cf. Freeman 2004). Hence, meaning does not stem from the fact that we can describe sounds as *inside* or *outside* a container, but from our involvement with the musical flow of events that may incorporate aspects of the sound's 'inness'.

In academic literature recording techniques and post-production effects are often described as *passive* devices, i.e., devices through which sound mediates. The virtual space of a recording is often described as a spatially neutral *equilibrium* at a given point in time. But this view does not give us the full picture of what these effects do, and what sound is for the listener. This survey suggests that sound engineers often articulate the inner workings of the mix in terms of *force dynamic metaphors*. In this sense they appear to think of recording technologies as *interactive* devices that may cause different kinds of *action* in the phonographic container.

4.1 FORCE Gestalts

Force is a prevalent category in our understanding of the world, although we may only notice it when it acts unexpectedly. Leonard Talmy (1981, 1985) argues that *force* is an important aspect of all language structures. These *force structures* Talmy calls *force dynamics* since they refer to how entities interact *forcefully* with each other. Forces emerge as an elaborate system with different outcomes: e.g., forces may be *resisted*, *obeyed*, *overcome*, *blocked* or *absorbed*. The dynamic field of forces determines the outcome. Let us take as an example this expression: ”John cannot go out of the house”. The outcome of this situation is that John is still in the house. Yet according to Talmy it is a barrier that causes the outcome (in this situation an unknown barrier), and prevents John from going out, although he has a *tendency* to do so (Talmy 1985).

The idea that we ascribe an intrinsic *force tendency* (*action* or *rest*, *strong* or *weak*) to entities in language and thought is central to the present study. As we shall see, the relation between sounds and container is often characterised by a force dynamic relation emerging from the force tendencies of the sound and the container. As Mark Johnson (1987) notes, these dynamic relations have a schematic quality. Johnson extends Talmy's findings to image-schematic FORCE gestalts, by asserting that there is an overlap between the meanings of verbs as applied in rational argument and as applied to the physical world. He then identifies a link between the modals '*must*, *may* and *can*' to the image-schematic FORCE gestalts COMPULSION, REMOVAL OF RESTRAINT and ENABLEMENT respectively (Johnson 1987).

Even though *force dynamics* was originally applied to describe verbs of motion, it is easy to see how this notion can describe the production and experience of sound. As I will show (section 5) FORCE schemas make it possible to account for structures of recorded sounds that are often neglected in other sound analytical approaches. I will argue for a broader view on sound experience that acknowledges what Talmy (2003) calls *causative situations*, i.e., the view that experience consists simultaneously of the caused and the causing event. In the following, I will discuss a few of the schemas that I find most pertinent to the present discussion, although many more influence how we reason about recorded sound.

4.2 Out-Orientation

As mentioned above we may think of sounds as dynamic objects acting within a three-dimensional phonographic container. Different characteristics of the container allow sounds to act in different ways, and different characteristics of the sound itself may provide for certain kinds of actions. Individual sounds are usually thought of as bounded objects constrained by other sounds in the mix. Sounds that are *tucked in* too much can thus be brought *out*, making the sound more *accessible*.

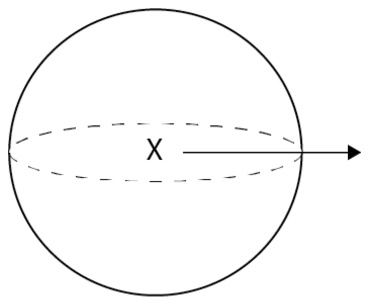


Figure 2: OUT schema

Whereas *in* and *out* can relate to physical orientation in space, the spatial orientation may be more abstract in other cases. In the following quotes sounds are described as moving entities with an *out-orientation* (Figure 2).

- I did … ride a couple of notes that didn't *come out* clearly. (Robert Carranza *in* Tingen 2008, May)
- When I put [the sound] through Linear Phase Equalizer it suddenly *jumped out*. (David Pensado in Tingen 2007, Jan.)

- A sampled handclap was made to *stand out* in the track by application of heavy low-end boost, shelving cut above 12 kHz and stereo widening. (Joe Zook in Tingen 2008, Jun.)

In these cases the out-movement describes the sound's orientation from a bounded position to a more *accessible* position. If a sound engineer *takes a sound out of the mix*, it means that the sound is no longer there. He has simply removed the sound from the mix. *Bringing a sound out* or making it *stand out*, however, means bringing it into prominence, e.g., into the auditory space available to the listener. C*oming out* is thus a metaphor that sound engineers use to describe how sounds are made *accessible* to the listener in the recording.

We can even think of positions that are neither *fully in* nor *fully out*. It seems that recording engineers often try to achieve a *balance* between these two positions. We can therefore consider availability and unavailability as endpoints on a continuum. The following quotes highlight this feature:

- The only thing I did on the bass was manually ride a couple of notes that didn't *come out clearly*. (Robert Carranza *in* Tingen 2008, May)
- The Space Designer … sounds like a very high-end reverb that brings the vocals *out a little more*. (Greg Kurstin *in* Tingen 2009, May)
- I applied quite a bit of L1 on track 48, to bring the vocals *out slightly*. (Fraser T. Smith *in* Tingen 2009, Nov)

Clearly, *slightly* and *a little bit more* designate the 'level' of *out* in each of these sentences. In quote two the expression '*brings the vocals out a little bit more*' describes how much the vocal is available to the listener; in this case, a little bit more than before the Space Designer effect was used. Saying that a sound source is more or less available must mean that some 'elements' of the sound source are not available (like pouring more of the soup into the cup, but not all of it). It seems that sound sources are never characterised as *fully in* or *fully out*. They always reside somewhere in between. Therefore sounds are characterised as having both *available* and *unavailable* parts.

4.3 Open and Closed Sounds

Several meanings are attached to the idea of sounds *coming out*, and technical explanations that link the use of recording techniques with this metaphorical understanding not always clear-cut. For instance, in some cases a sound engineer may bring a compressor into the signal chain to bring certain sounds *out*, whereas in other cases compression helps to keep a sound *inside*.[1] Much depends on the treated sound sources, how the effect is used and what the auditory context is.

As mentioned earlier, we may think of sounds as bounded entities constrained by other sounds in the mix. We may, however, also think of the sound itself as a container with a *core quality*. Sometimes sound engineers describe sounds as fully enclosed, hiding their inner details, and sometimes sounds are described as more available (*open*) to us. Sound engineers thus seem to connect the idea of *open* and *closed* with the way in which a sound's core quality (its details) are *afforded* to us. Stanley R. Alten (2011: 463) links the *openness* of a sound with characteristics such as *airy*, *transparent*, *natural*, or *detailed,* whereas openness for Bruce and Jenny Bartlett (2009: 42) is described in terms of *gentleness* and *"letting the instrument 'breathe'"*. Both of these producers appear to connect *openness* with *unrestricted* sounds. *Open* sounds are given space to propagate, and are brought *through* to the listener in a *transparent* manner. Such experiences involve notions of force relations (Talmy 1981, 1985) in which sounds have a *tendency* to *come out* unless constrained by the stronger force of the container.

One way of generating a *closed* sound is to cut out high frequencies, whereas more *openness* is often achieved by boosting high frequencies to bring out more details. Filtration is thus an effect closely linked to the experience of *open* and *closed*. A sound that we are accustomed to may be perceived as *closed* when the high frequencies are cut out, whereas a sound with lots of high frequency content is described as *open*. These experiences of *open* and *closed* appear to be grounded in the acoustics of real-life situations, such as: (1) when we hear a sound emanating from within a closed container; or (2) when we hear a sound that reaches our ears without any obstruction between the sound source and the listener. In the first example some part of the high frequencies is

[1] Quiet sounds are usually brought *out* when the overall mix is compressed, whereas louder sounds that *stick out* too much may be compressed in order to *keep them in place*.

absorbed (filtered out) by the container, whereas in the second example we hear the sound unmediated. For the same reason, the experience of *open* sounds is related to *accessibility* and *closed* sounds to *exclusion*.

5. Case: Dynamic Range Compression

The aim of the following section is to explore the experiential effect of dynamic range compression and see how sound engineers make sense of the auditory outcome of this effect. Timothy Warner rightly notes that in the academic world "dynamic compression is perhaps the least well explored or understood of all recording processes" (2009: 134). There may be many reasons for this inattention to dynamic compression. It is likely, however, that musicologists avoid the subject because of the lack of terminology to articulate the experiential effect of compression.

In physical terms, a dynamic range compressor is a processor that turns down signals by a certain ratio when the signals reach above a certain threshold. But what happens to the experience of the sound, when a mix, or individual tracks within the mix, is processed with a compressor? There is no single answer to this question. Most listeners notice that a track appears louder (increased RMS) after being compressed and regained. If this experience were the sole effect of compression, however, its effect would be similar to shaping the volume with dynamic faders. The effect of the compressor is often a neglected aspect in musicological analyses of recorded sound. This is somewhat odd when we consider that almost all recordings have been dynamically compressed to some extent, and quite extensively in many pop music genres. Yet it may be precisely because of the conventionality of heavy signal compression in modern recordings that we rarely pay much attention to it anymore.[2]

5.1 The Impact of Compression on Auditory Experience

A significant finding in the study of sound engineers' use of metaphors was that they often articulate the effect of compression in terms of *force dynamics*. In fact, the term *dynamic compression* is in itself *force dynamic*.

[2] The increasing focus on loudness in modern popular music recordings has caused recording engineers to apply still greater levels of compression. This tendency has led critics to talk about a *loudness war* (Milner 2009).

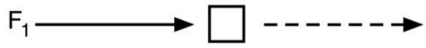


Figure 3: COMPULSION (Johnson 1987: 45)

COMPULSION denotes the *force* exerted on an object which causes it to move in a given direction. This *force* is always headed in a certain direction along a path. Sound engineers use several expressions that relate to the COMPULSION schema (Figure 3), when describing the effect of sound editing:

- When the drummer hits the snare, [the compressor] *sucks down* and you get a good crest on it. (Lee DeCarlo *in* Owsinski 1999: 5)
- If one side gets significantly louder the compressor will *grab it* and *pull it down* a little. (Jason Goldstein *in* Tingen 2007, Apr.)

These are cases of *caused* motion in which objects are moved by external *forces*. The *forces* are in both cases specified by the compressor setting. We can also see how the COMPULSION schema in both cases is dependent upon the PATH schema. The *force* moves along a vertical path going downward, whether it is *sucking down* or *pulling down*. In both examples the *force* is exerted on the sound from beneath it.

5.2 REMOVAL OF RESTRAINT Schema

The *force* may also follow a path that *transcends* the boundaries of the container. Consider the expression "the compression just helps [the sound] to *cut through* a little better" (Serge Tsai *in* Tingen 2007, Jun.). To say that the sound is *cutting through* something implies that music is moving from one container to another. We can say that the sound follows a path with a starting-point in the phonographic container and an end-point in listening space. In this way the sound penetrates the boundaries separating these two spaces. This event activates the REMOVAL OF RESTRAINT schema (Figure 4) that connects experiences of overcoming a boundary or obstacle that hinders an object's movement from one point to another:

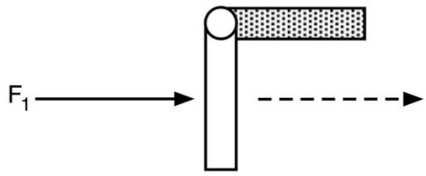


Figure 4: REMOVAL OF RESTRAINT (Johnson 1987: 47)

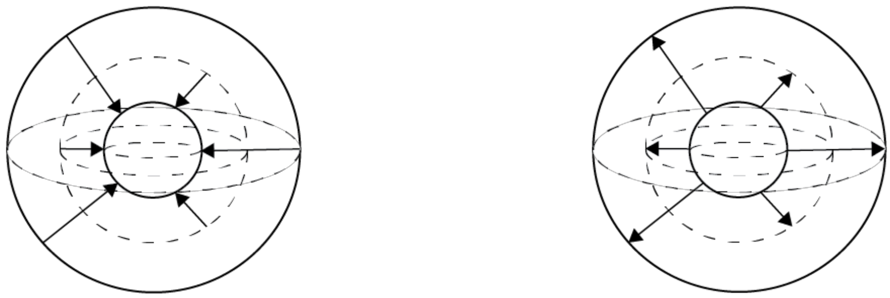
The REMOVAL OF RESTRAINT schema describes an obstacle that is removed by some entity that follows a path in a certain direction. Tsai's quote does not specify what the removed obstacle might be. Doubtless he is referring to the mix as such but exactly how the mix constitutes an obstacle to the specific sound remains unsolved. Since the compressor is the tool needed to fix the problem, we can assume that the obstacle is mainly related to volume. *Cutting through* implies making the sound audible by either making it louder (in the entire bandwidth or only in specific frequencies) or turning other sounds down.

5.3 EXPANSION and CONTRACTION Schemas

Squeeze is another common way to express the *force* exerted upon sounds by the compressor. For instance:

- There's also a compressor, which is working pretty hard, *squashing* the sound as hard as possible. (Greg Kurstin *in* Tingen 2009, May)
- What I'll do is put the drums in a limiter and just *crush* the hell out of it. (Lee DeCarlo *in* Owsinski 1999: 55)

The *forceful* nature of *squeeze* is not exerted from below the sound, but rather from all directions. Consequently *squeeze* has a different image-schematic structure from *pull* and *suck*. *Squeeze* is also connected to the CONTAINMENT schema. We can understand *squeeze* as a process of either making the container smaller or making the contained object bigger. When a contained object is *squeezed,* it has less room in which to move. Accordingly, the image-schematic structure of *squeeze* is related to the *size* of the contained object and/or the capacity of the container. CONTRACTION and EXPANSION schemas (Figure 5) come to mind here.



CONTRACTION OF CONTAINER

EXPANSION OF CONTENT

Figure 5: CONTRACTION and EXPANSION schemas (inspired by Brower 2000: 353)

The EXPANSION schema is also argued for in Candace Brower's article "A Cognitive Theory of Musical Meaning" (2000). Differently from the present study, however, Brower focuses on harmonic and melodic progression in music. She describes how the EXPANSION schema is activated when, for instance, a rising melodic line and a descending bass line occur at the same time. She thus connects CONTRACTION and EXPANSION with the changing boundaries of the pitch register.

In this article I show how CONTRACTION and EXPANSION are connected to the interaction between compressor and sounds in the phonographic container: for instance, by limiting the capacity of the sound container. If the overall mix is compressed, the boundaries of the sound container come to the fore, since the sound exceeds *force* on the boundaries. The capacity of the sound container is then brought to the fore when the contained sound reaches the maximum *volume*, or even goes above this level. This also implies that we must see recorded sounds as *squeezable* objects, because of their ability to lower the capacity of the sound container beyond the *amount* of sound. In this way the experiential effect of compression is represented as a *contraction* of the sound container.

5.4 Sounds as Living Organisms

This experience of CONTRACTION and EXPANSION is bodily embedded. Think about the heart and lungs that constantly oscillate between contraction and expansion. The metaphorical connections to bodily organs are articulated by sound engineers when, for instance, talking about making ”the compressor *breathe* in time with the song” (Owsinski 1999: 55) or making a sound *pump* in sync to the music. In fact, sound engineers often conceptualise sounds and sound sources in terms of living organisms. This is especially so when the conversation revolves around compression: e.g., techniques to ”make the compressor *breathe*” (Owsinski 1999: 62); ”making the [sound] come *alive*” (Ed Seay *in* Owsinski 1999: 231); and over-using compression so that the sounds are ”squeezed to *death*” (George Massenburg *in* Owsinski 1999: 199). These expressions all circle around the conceptual metaphor THE MIX IS A LIVING ORGANISM.

As we have seen, sound sources are not static entities. They *act* and *interact*, not just *in* the phonographic container, but also *through*, *with* and *against* it. When a dynamic compressor is applied to the signal chain, it will not just alter the signal independently of the characteristics of the sound routed through it. A compressor *reacts* to the level and the spectrum of sound and often there is a strong sense of the involvement of *interaction*, *causal connections* and *energy*. When sound engineers make alterations to a sound they do not think of these alterations as something that happens *in* the sound source, but consider that something else *interferes* and causes the alterations. Therefore, rather than being a stable frame, the phonographic container is, so to speak, immersed in the dynamic flow of sounds that *balance* and *unbalance* each other, creating different forms of *tension*.

5.5 Active Containment

As argued, sound engineers appear to understand sound events as causal sequences that are structured by bodily *force dynamics*. This claim has implications for how we understand sound editing on a more general level. We have seen how the compressor *pulls*, *pushes* or *ducks* the sound, which causes it to *come out more clearly*, *sit well in the mix* and so forth. These actions, caused by the compressor, do not only describe a cause-effect relationship. They are essentially expressing the compressor’s *control* over the sound sources.

Physical control is a common way to express the more abstract *control* exerted by effect units on sounds:

- When you turn the ratio right up and lower the threshold it kind of *grabs* the sound in a way that no other compressor does, giving it a really sharp-sounding front end. (Robert Orton *in* Tingen 2009, Mar.)

In this example Robert Orton describes how the compressor *grabs* the sound to manipulate it in a certain way. *Grabbing* describes the compressor's *control* over the sound. In this sense the event of *grabbing* constitutes an interesting instance of containment. A common occurrence of grasping is when we reach out to grab an object with our hands. This event causes the object to be *in* our hands. The event includes the act of *enclosing* our hands around the object. Our hands then constitute an *active* container that *forces* its constraints upon the object. This event corresponds to how sound engineers often describe the compressor as an *active* container. In his study of literary thinking Mark Turner (1996) explains how such action-stories are often projected onto other events:

> It is common to project action-stories of grasping and controlling physical objects onto other event-stories. Conditions we control and enjoy correspond parabolically to physical objects we grasp, possess, and control … Within this logic of objects and grasping, something reliably within our grasp is subject to our control. When we project an action story of grasping, we project this logic. (Turner 1996: 34)

Accordingly, a compressor is conceptualised as a device that allows sound engineers to *control* sounds in different ways. This becomes even clearer in the following quote by producer Jason Goldstein:

- If one side gets significantly louder, the compressor will *grab* it and *pull it* down a little. (Jason Goldstein *in* Tingen 2007, Apr.)

The event described in this quote includes the act of *enclosing*, but we also see a combination of events that precedes and follows the enclosure. The sequence has a three-part structure: (1) the sound gets louder; (2) the compressor *grabs* the sound; (3) the compressor *pulls it down*. Looking at sequence 1 -> 2, we notice that the compressor *grabs* the sound only when the sound is getting louder.

Such experiences correspond to findings by Robert B. Dewell (2005), who argues that most of our experiences of containment involve both ENTRY (an object going into the container) and ENCLOSING. This finding has implications for the understanding of the CONTAINMENT schema as presented by Mark Johnson (1987). In Johnson's view a container is generally a passive element, and objects actively move in and out of it. In Dewell's (2005) account both the container and the contained object can act as active elements. Hence, containing is something the compressor actively does by grabbing the sound, i.e., *enclosing* the sound, and exposing *force* upon it. In this context the idea of CONTAINMENT as ENTRY CLOSING can be seen as broadening the CONTAINMENT schema, which adds to the understanding of the phonographic container by accounting for the dynamic processes that restructure and activate its internal structure.

6. A Functional Geometric Framework

In this article I have argued for a move from viewing containment in geometrical terms, as objects located within something else, towards a view of containment as a force dynamic structure. Geometrical containment is about physically locating an object within a container. This notion, however, fails to acknowledge two aspects of containment: (1) that objects and containers interact with each other; and (2) that both container and objects have specific *functional* features that affect our perceptions of containment.

Enclosure can take different forms. For an object to be fully enclosed, it is normally required to be fully surrounded by something else, e.g., canned beans. If we pour the beans into a bowl, they are no longer topologically enclosed. The bowl provides in many ways a weaker form of enclosure than the can, since it only partially encloses the beans. Thus the can and the bowl reflect two different 'degrees' of containment (Coventry & Garrod 2004). To be characterised as a container, however, the object must *function* as container.

For an object to be positioned within a container the container needs to constrain the object in some way — there must be a *functional relation* between the container and the content. If the container moves, the object will move with it. This idea is presented by Kenny C. Coventry and Simon C. Garrod (2004), who argue that the preposition *in* involves both a geometric relation (*enclosure*) and an extra-geometrical relation (*location control*). This idea is developed further in the following section.

6.1 Location Control

The constraints of different sorts of containers are associated with varying degrees of *location control*. For instance, we think of a ball being *in* a bowl, even though the bowl does not fully enclose the ball. Nevertheless, the bowl keeps the ball in the same position, even when the bowl is moved. For this reason the bowl provides some degree of *location contro*l. Coventry and Garrod, however, found that the degree of location control diminishes gradually if the bowl is tilted. The perception of location control is thus related to the specific features of the container and the specific event that takes place. A container may fully enclose an object, providing a strong degree of location control, or only enclose it partially and provide a weak enclosure.

The specific features of the reference object (e.g., a ball) also contribute to the perception and representation of containment. Feist and Gentner (1998) demonstrated that animate objects (e.g., a fly) were less likely to be represented as *in* something than inanimate objects (e.g., a coin). Again, this finding is related to the idea of containment as location control. Since a bowl does not control a fly in the same way as it controls a ball, test subjects found it less appropriate to use the preposition *in* for the location of a fly than for the location of other inanimate objects. Feist and Gentner found that similar variations existed for different features of the container, e.g., the difference between something located in a hand (*animate container*) or a bowl (*inanimate container*). Thus the animacy of the container may also have an influence on the perceived degree of location control.

6.2 The Relation between the Phonographic Container and its Content

Both geometrical space and extra-geometrical features are represented in the way in which we talk about containment. To be precise, 'what' the contained object and the container are determines, to some degree, how we put into words 'where' the object is (Carlson-Radvansky et al. 1999). Spatial relations are not only represented through geometric routines but also through how objects act and interact.

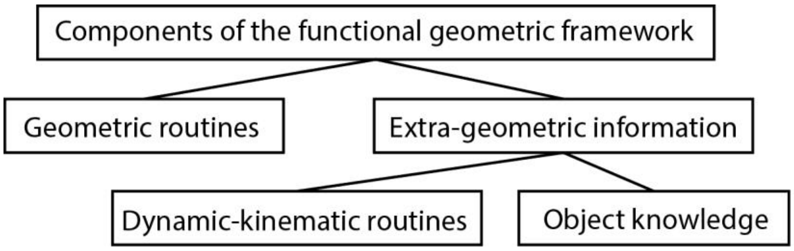


Figure 6: Functional Geometric Framework (Coventry & Garrod 2004: 55)

Spatial language is grounded in both *geometric routines* and *extra-geometric information* (Figure 6). Each of these elements may have more or less influence on the prepositions used to describe a scene. In some instances the actual geometry of a scene, i.e., the position of objects in Euclidian space, may determine the particular preposition, whereas extra-geometric information may have more influence in other situations. Coventry and Garrod divide extra-geometric information into two branches. The first branch, dynamic-kinematic routines, describes the perceived potential or actual dynamics in a scene, e.g., how objects act and interact and how the action and interaction evolve over time. In this context, dynamic-kinematic routines involve the perceived location control of a scene, i.e., the potential action of the contained object and its interaction with the container. The second branch, object knowledge, involves knowledge about the typical function of the object in a specific situation.

In the following quotes we can see how sound engineers use different, though metaphorically related, expressions to describe the enclosure of the container and the features of the contained object:[3]

(1) Container features

- If you add around 10k it *opens everything up*. (Marcella Araica *in* Tingen 2008, Feb.)
- *Open up* the bandwidth until you get the snare to jump out. (Owsinski 1999: 33)

[3] One of the problems related to applying the principles of the functional geometric framework to the auditory domain is that the distinction between the features of the reference object and the features of the container is not as clear-cut as in the visual domain. In other words, what count as features belonging to the sound source (*the contained object*) and what count as features belonging to the phonographic container may in many cases be fluid.

- The compression on all three of them was just to make sure nothing *jumped out* at you. (Demacio 'Demo' Castellon *in* Tingen 2008, Jul.)

(2) Contained object features

- If you make the attack harder, something will sound louder. It will *cut through* the mix without having to add additional volume. (Jason Goldstein *in* Tingen, 2007, Apr.)
- I also have to keep the kick and snare really punchy to kind of *cut through* (Jerry Finn *in* Owsinski 1999: 112)

These descriptions not only capture features of the container and the contained object respectively, they also add to the understanding of the mutual spatial relations between them. The first quote by Marcella Araica points to the understanding of the potential transformation of the container: if the frequency spectrum around 10 kHz is boosted, the container will change from a more closed state to a more open state, providing less *location control* for the sound sources in it. Likewise, Jason Goldstein describes how sound sources should be altered in order to *penetrate* the container.

Often compression activates a whole series of causally related events. Producer Tom Elmhirst articulates some of the complexities related to compression in his description of the tune "Rehab" (*Back to Black*, 2006) by Amy Winehouse:

- The Urei [compressor 1] will have been set with a very fast attack and a super-fast release, doing perhaps 10 dB of compression, while the Fairchild [compressor 2] will have had a very slow release. I can't quite explain what this does, but in my head the Urei will *catch* anything that *jumps out*, while the Fairchild will *pick up* the slack and keep a more constant *hold* of the vocal. (Tom Elmhirst *in* Tingen 2007, Aug.)

Although Elmhirst claims that he cannot explain what compressors do, he actually provides a fairly comprehensive description. At least four expressions of *forceful* action are detected in this quote: *catch*, *jump out*, *pick up* and *hold*. *Jump out* describes the sounds as *forceful* objects that *act*, moving from the inside to the outside of the container. This is counter-weighted by compressor 1 (the Urei) that *catches* the sound, preventing it from jumping out. A second compressor *picks up* the slack and keeps a *hold* on the vocal, confining it to a fixed position. The *forces* of the vocal sound are restricted by the compressors, which on the one hand cause the voice to stay in the container and on the other hand keep it in a fixed position within the container.

In summary, I have presented two elements in the experience and description of sound sources in the phonographic container based on the linguistic corpus of interviews and sound engineering textbooks: (1) a purely geometric component defined in terms of physical localisation; and (2) a functional component that suggests the interactional and functional relation between the container and the contained object. Accordingly, the phonographic container does not constrain sounds in a predetermined way. It can take different forms and provide various 'degrees' of spatial *constraint* in different tracks.

7. Discussion

We have seen how embodied image schemas connect experience and conceptualisation and thereby represent particular experiences of auditory events. It was shown how schematic structures foreground the kinaesthetic components of the interaction between the sound and compression, and bring awareness of the *tensions* that are central to the experience of recorded sounds. The bodily response to 'active sounds' presented in this article, however, is of course only one of several ways in which recorded music makes sense to us. I have pointed to potential, yet undefined, meanings that musical sound may evoke in listeners. Consider, for instance, the variety of ways in which the perceived bodily gestures of musicians can enhance or change the emotional response to music (Frith 1998). These potential meanings point to an indexical layer of musical experience, grounded in the agency of actual sound sources (actual events) found outside the music itself. This study, however, has pointed to the *agency* of sounds-in-themselves within the sound structure of recorded music (virtual events), events we make sense of through bodily embedded experiences.

When we talk about sound phenomena in music we tend to objectify sounds, reducing them to static phenomena. Musical meaning, however, is not a response to something static but stems from our involvement with the musical flow of changing events. Consider, for instance, how, at the formal level of musical structures, we talk about the *movement* of a melody, harmonic *progression* or the *tension* of a dominant seventh chord before it *resolves* to the tonic (Zbikowski 2002). Such expressions remind us that force dynamic structures are found on many levels of musical experience, and constitute one of the essential ways in which sounds make sense to us as music (Hjortkjær 2011). Recorded sounds, in fact, make sense to us in terms of how they *behave* within the phonographic container and succeed each other to be perceived as musical motion. In this sense sound (the flow of active sound events) and music (in the sense of formal structure) have mutually related meanings.

8. Conclusions

The metaphorical domain is well established in the study of music, yet there is still much to be said about the connection between language and the experience of musical sound. This article has sought to account for how sound engineers conceptualise recorded sounds. The study revealed that sound engineers often think in *force dynamics* when describing the inner workings of an audio mix. Believing with Lakoff and Johnson that these metaphors are not randomly picked, but form an essential structure of our musical understanding, I suggest that the identified expressions of *force* offer important clues as to the experiential qualities of recording practice and post-production effects. Sounds *act* and are *acted* upon by effects in the phonographic container, e.g., we may perceive the potential for a sound to move forward if it was not held back by some other effect. Such experiences were accounted for by referring to Leonard Talmy's conception of *force dynamics*.

Although we know a lot about the techniques of compression, the experiential effects of compression have previously been neglected in musicological writings, possibly because of the lack of an adequate vocabulary. I have suggested that the focus on FORCE metaphors makes a central contribution to the description of this effect.

CONTAINMENT is the central image schema discussed in this article. Using Coventry and Garrod's notion of *location control* I pointed to the idea that sounds interact with the phonographic container. They engage in what we may call a *functional relation* that reflects different 'degrees' of containment. I argued that we should think of the phonographic container as an active container that interacts with the content. The phonographic container simply *functions* as a container in different ways, described in terms of the container's *ability* to *constrain* the sounds. For instance, sound engineers described some tracks as being *full* or as having *empty* regions, some appeared *closed* or more *open*, and in some tracks sounds *came out* clearly, whereas they were more *tucked in* in others. Further sounds have different *sizes* that take up more or less space in the container. Generally low frequency or loud sounds are characterised as *larger* than high-frequency or low-level sounds (Gibson 2005: 34-35). Sound engineers may also refer to other characteristics than the content volume. The *boundaries* of the phonographic container may have different characteristics and the container may *enclose* the sounds in different ways, providing a more *closed* or *open* structure, e.g., in some tracks the sounds may seem fixed and constrained, whereas other tracks have sounds that are more *loosely constrained*.

The finding suggests that we should focus more on the active shaping *forces* of the phonographic container. Not only are the static characteristics of the sound source and the position of the sound source felt, but also its potential *force,* i.e., its tendency to act. Consequently I suggest that the language of sound engineers yields further insight into the impact of recording technology on the listening experience and the potential meaning of recorded music.

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