Bregman (1990) on "Auditory Scene Analysis": The fathers of Gestalt psychology, who opened up the whole question of perceptual organization, had focused on vision and never quite got around to audition. To recognize the unique timbre of the voice we have to isolate the frequency components that are responsible for it from others that are present at the same time. The fact that we choose the right timbre implies that we generally choose the right components in different contexts. Since Aristotle, many philosophers and psychologists have believed that perception is the process of using the information provided by our senses to form mental representations of the world around us. In using the word representations, we are implying the existence of a two-part system: one part forms the representations and another uses them to do things as calculate appropriate plans and actions. The job of perception, then, is to take the sensory input and to derive a useful representation of reality from it. An important part of building a representation is to decide which parts of the sensory stimulation are telling us about the same environmental object or event. Unless we put the right combination of sensory evidence together, we will not be able to recognize what is going on. Ex. The pattern of letters from Bregman 1981b. Business of separating evidence. An auditory stream is our perceptual grouping of the parts of the neural spectrogram that go together. To see the reasons for bringing in this concept, it is necessary to consider the relations between the physical world and our mental representations of it. … I refer to the perceptual unit that represents a single happening as an auditory stream. Why not just call it a sound? There are two reasons why the word stream is better. First of all a physical happening (and correspondingly its mental representation) can incorporate more than one sound, just as a visual object can have more than one region. A second reason for preferring the word "stream" is that the word "sound" refers indifferently to the physical sound in the world and to our mental experience of it. Any system that attempts to build descriptions of a natural world scene must assign the perceptual qualities that it creates to one organization or another. The quality "loud" is assigned to the organization that represents the roar of the lion. The quality "far" is assigned as the distance of that same event. The Gestalt psychologists made this point by introducing the principle of belongingness. In describing the visual organization of drawings… they pointed out that the lines at which the drawn irregular figure overlaps the circle are generally seen as part of the irregular form and not of the circle. That is, they belong to the irregular form. There is a second principle that I want to introduce here because it has a connection with the principle of belongingness. This is the principle of "exclusive allocation." It can be seen in an ambiguous visual figure such as the vase-faces illusion of the Gestalt psychologists. Another case of exclusive allocation is shown in an experiment by Bregman and Rudnicky, using the pattern of pure tones shown in figure 1.7. In this figure the horizontal dimension represents time and the vertical one shows the frequency of the tones. The listener's task was to decide on the order of two target tones, A and B, embedded in the sequence. Were they in the order high-low or low-high? When A and B were presented alone, as an isolated pair of tones, this decision was very easy. However, when the two tones labeled F (for "flankers") were added to the pattern, the order of A and B became very hard to hear. Apparently when they were absorbed as the middle elements of a larger pattern, FABF, the orders AB and BA lost their uniqueness. This experiment was about the perceptual allocation of the F tones. As long as they were allocated to the same auditory stream as A and B, the order of A and B was hard to hear. | One auditory phenomenon with a direct parallel in vision is the auditory streaming effect… the faster the sequence is presented, the greater is the perceptual segregation of high and low tones. In the visual analogies, the grouping is predictable from the Gestalt psychologists' proximity principle, which states roughly that the closer the visual elements in a set are to one another, the more strongly we tend to group them perceptually. The Gestalt psychologists thought of this grouping as if the perceptual elements – for example, the tones in figure 1.9 – were attracting one another like miniature planets in space with the result that they tended to form clusters in our experience. If the analogy to audition is a valid one, this suggests that the spatial dimension of distance in vision has two analogies in audition. One is separation in time, and the other is separation in frequency. The Gestalt principles of grouping were evolved by a group of German psychologists in the early part of this century to explain why elements in visual experience seemed highly connected to one another despite the fact that the incoming light rays, pressure energy, sound saves, and so on stimulated discrete sensory receptors such as the ones found in the retina of the eye. The word Gestalt means "pattern" and the theory described how the brain created mental patterns by forming connections between the elements of sensory input. … Apparent motion is the perceptual effect that used to be very popular on the billboards of theatres, where the switching on and off of a series of electric light bulbs in sequence gave the experience of movement. In the laboratory it is usually created in a much simpler form. A more elaborate form of the apparent motion effect strongly resembles the streaming effect. | It is commonly said that the Gestalt principle of closure is concerned with completing forms with gaps in them. But if it did that, we would not be able to see any forms with gaps in them, which would be ridiculous. The principle is really one for completing evidence with gaps in it. The Gestalt psychologists argued that closure would occur in an interrupted form if the contour was "strong" or "good" at the point of interruption. This would be true when the contours of the form continued smoothly on both sides of the interruption so that a smooth continuation could be perceived.

Reading Guide: Kivy, P. (2002). Introduction to a Philosophy of Music. Chapter 10: Narration and Representation. Oxford; New York: Clarendon Press: 182-201. Reading Type/ Profile Book chapter, from a single-author book designed to introduce an undergraduate student audience to the core issues in the philosophy of music and musical aesthetics. It includes chapters on history, formalism, emotions in music, and words without songs. Published in 2002. Author Background Peter Kivy (1934-2017) was a musicologist and philosopher at Rutgers University, who had a PhD in philosophy from Columbia University and an honorary Doctorate of Music. He wrote extensively about aesthetics and the philosophy of music in 90 articles and 23 books (source: Larry Temkin, "In Memoriam: Peter Kivy" 2017 https://www.philosophy.rutgers.edu/people/in-memoriam/899-in-memoriam). In his early career, Kivy was interested in analytic aesthetics, particularly 18th century British aesthetics, gaining respect in the field with his book The Corded Shell (1980). His later works explored the philosophy of music, particularly focusing on the emotional quality of music. In addition to his work in philosophy, Kivy was an active oboist who performed in a variety of venues. Kivy was a giant of aesthetics and one of the foremost philosophers of music. Abstract/Summary In this chapter, Kivy explores how music is understood using aided or unaided pictorial representation as well as structural representation. It details the similarities and differences between how we experience visual art as compared to music and analyzes the fundamental question: Does music represent anything or is it really the words set to music that do all the representing? This chapter determines that music demonstrates aided pictorial representations, but not unaided pictorial representations, and responds to the claims of Roger Scruton and Jenefer Robinson, countering both of them. Finally, this chapter addresses the issue of whether program music can be fully enjoyed without its programmatic text, and how such music differs from absolute music. At the end of the chapter Kivy claims that absolute music cannot arouse "garden-variety emotions." Important Details Pictorial Representation is when one 'sees in' or 'hears in' to a piece of visual art or music. Richard Wollheim coined the term "seeing in" to describe how we perceive and interpret the representational object of visual art. Kivy uses this term to create another term, 'hearing in,' which describes how we perceive and interpret the representational object of music, the object being what the composer is representing through sound. Jenefer Robinson argued that we do not 'hear in.' Kivy responds that Robinson is setting requirements for 'seeing in' at a lower level than those for 'hearing in,' but does concede that 'hearing in' is usually aided while 'seeing in' does not always need to be. Pictorial representation is further broken down into the categories aided (accompanied by textual clues that guide the listener's 'hearing in') and unaided (standing alone). Kivy introduces Pacific 231 as the closest thing he has heard to unaided pictorial representation in music. In Pacific 231, Honegger emulates the sound of a train's journey. While listeners can generally identify, without textual help, that they are hearing a representation of the sounds of a train, they need to be told to listen for something. Therefore, Kivy says "Unaided pictorial representation in music is, if possible at all, too rare a phenomenon to be counted as belonging to music's repertoire of aesthetic possibilities." This means that almost all pictorial representation in music is aided representation (2002 p. 185). Examples of aided pictorial representation include Beethoven's representations of birdsongs in the Pastoral Symphony and Schubert's representation of a spinning wheel in 'Gretchen at the Spinning Wheel'. Pictorial representations of sounds are reconstructions in that the musical version can be distinguished from the authentic sound being represented. Roger Scruton argued that pictorial representations of music are reproductions or imitations of the original sound, not interpretations through music. Kivy responds that even music representing other music, such as Wagner's representation of a 16 th century Lutheran hymn, is pictorial representation because Wagner portrays the 16 th century hymn using the medium of 19 th century musical styles. It is important to understand that 'hearing in' of sounds in pictorial representation is not the same thing as an illusion, in which the listener believes that they hear something that is not present. 'Hearing in' does not involve deceiving the ear into thinking it actually hears a bird singing, but rather using an oboe as the medium to create careful musical suggestions to bring the auditory image of a bird singing to mind. Structural Representation, in contrast to pictorial representation, is when the structure of a piece of music parallels the structure of a plot instead of mimicking a sound. Kivy uses the example of the resolution of the key from G major to D major in Mozart's the Marriage of Figaro, which parallels the resolution of differences between characters. Structural representation is also aided representation. For example, one cannot assume that every resolution of the key in music represents a resolution between characters; only the accompanying story can illuminate that. Absolute music is music that is purely instrumental and has no accompanying text to give clues about a story. Mozart's Symphony No. 40 in G Minor is one example. Someone may write a story to go with this piece of absolute music, but that does not define what is happening the music. G.W. F. Hegel (1770-1831) was a philosopher of the fine arts who argued that absolute music cannot have content and thus is not a fine art. Programmatic Symphonies and Tone Poems are two examples of program music. Program music is characterized by having extramusical ideas that are represented by the 'program' which may be a title or a story to go with the music. Kivy uses Berlioz's Symphonie Fantastique as an example of this because each of its five movements are accompanied by a title and text describing the love story that the music intends to illustrate. Kivy argues that the text, rather than the music, tells the story, and therefore the text is necessary for the full appreciation of the piece. Scruton also argues that program music can be fully appreciated without the program, so it is not truly narrative. Kivy responds that program music may be able to stand on its own. However, it cannot be fully enjoyed without the program it was written for, and without its program, it is not as good as other works of absolute music, because it includes portions of music that do not make sense without its story. Kivy argues that absolute music cannot arouse the variety of emotion that texted music can. We think that Kivy establishes too narrow of a viewpoint on the relationship between emotion and music. Based on our backgrounds playing and listening to music, personal experiences and feelings often influence the emotional meaning absolute music carries. In order for a performer to communicate effectively with their audience, is Kivy suggesting that they should ground their approach to the piece in a narrative?

RG 2: Jackendoff, R. (2012). Language. In K. Frankish & W. M. Ramsey (Eds.), The Cambridge handbook of cognitive science (pp. 171-192). Cambridge: Cambridge University Press. Reading Type/Profile Book chapter, from a multi-author handbook that addresses many facets of cognitive science. The handbook also includes chapters on perception, human learning and memory, reasoning, emotion, and consciousness. The book was compiled and edited by Keith Frankish and William M. Ramsey. Author Background Ray Jackendoff (b. 1945) is the Seth Merrin Professor of Philosophy and emeritus Co-Director of the Center for Cognitive Studies at Tufts University. His PhD in Linguistics (MIT, 1969) was advised by Noam Chomsky, commonly credited as the father of modern linguistics. Jackendoff's research links generative linguistics and cognitive science. He developed the framework of Conceptual Semantics, which aims to define the formal structure of cognition that allows semantic processing and illuminate the relationships between language, perception, and cognition. Essentially, he aims to grasp how language is stored, represented, accessed, processed, and produced within the mind. He also plays the clarinet and attempts to relate music to cognitive science and linguistics; his 1983 book (co-authored with F. Lerdahl) A Generative Theory of Tonal Music proposes a theory of musical cognition grounded in theories of generative linguistics. He has also written several other books, including Foundations of Language (2002), Language, Consciousness, Culture (2007), and A User's Guide to Thought and Meaning (2012). Abstract/Summary In this chapter, Jackendoff provides an introduction to many of the central issues in linguistics and how the study of language is integrated with cognitive science in general. The chapter begins by introducing the three major subfields of linguistics: phonology, the study of speech sounds; syntax, the study of sentence structures; and semantics, the study of word and sentence meanings. Using a semantically-grounded approach, he then describes the major theories of combinatoriality and sentence processing. Finally, he concludes with a discussion of what features might uniquely enable the human brain to process language. Important Details THE THREE MAJOR DOMAINS OF LINGUISTICS Phonology: The systematic organization of sounds in a language. (Phonetics, on the other hand, is the actual physical mechanisms behind production and perception of speech. Syntax: The structure and order of words; grammatical structure. Semantics: The structure of meaning; how we communicate meaning through language. Semantics is language independent, that is, semantic structure is given by the world, not by any particular language. Figure 1 (173) COMBINATORIALITY Combinatoriality: The ability to create novel sentences and phrases from combinations of stored items in the lexicon. Generative Grammar: A set of phrase structure rules (rules that specify how elements of a sentence are combined) formulated so to allow us to create an infinite number of possible sentences, represented with trees like the one in Fig. 1. Syntactic structures are built algorithmically, and then distorted by a sequence of operations known as restructurings which lead to phonological structure and then to semantic structure. Treelets: Syntactic models, such as [VP V (NP) (PP)], where the spaces can be filled in by anything that falls into that category, and these items get semantically linked. Unification (Clipping): placing pieces of structure into these treelets. Treelets in the lexicon provide grammatical expectations and define what is allowed and what is not allowed. Embedding: The incorporation of units (treelets) within larger units (bigger trees) via phrase structure rules. Recursion: The process in which one clause is embedded in another. The embedded clause and embedding clause follow the same phrase structure (syntactic) rules. WORDS-RULES CONTINUUM Also known as expanded lexicon: the idea that we cannot derive all meaning from syntactic combinations alone. Therefore we must store other linguistic units besides words in long term memory, such as idioms, morphemes and phrase structure rules. Idioms: Their meanings aren't derived directly from the words that make them up. Thus, they must be stored in our brain as larger phrases with their own semantics. Verb conjugation / verbal morphology rule: suffix -d (hug/hugged), -t (walk/walked), -ad (add/added) ● Here, we store the regular past tense rule and morpheme, and we store the verb separately. ● Morpheme: The smallest unit of meaning. Morphemes can be smaller than words; for example, the past tense suffix -ed. Irregular past tenses in English: sing/sang, go/went, have/had, eat/ate, catch/caught ● Here, we store the verb and its tense irregularity together. There is no past tense morpheme. LANGUAGE PROCESSING Sentence processing is 1. Incremental: We guess at syntactic structures based on the first few words 2. Opportunistic: We make use of all available information, including non-verbal information WHAT IS SPECIAL ABOUT HUMAN LANGUAGE? Four major properties: 1. "Characteristics of language that have required no changes from the ancestral genome" (187). Lungs, ears, etc. 2. "Innovations in the human lineage that are essential to language… but that serve purposes more general than language" (187). Voluntary breath control, imitation, fully developed theory of mind. 3. Characteristics unique to humans used solely for language and formed by alterations of preexisting biological structures. Shape of human vocal tract, neural structures for controlling it. 4. "Aspects of language that require something new and unprecedented in the primate lineage" (188). Capacity for recursion, arguably, or maybe this category is empty. "What appears special about human language is the existence of phonological and syntactic representations, plus the ability to use these to voluntarily code and express thought." (189)

Reading Guide: Amusia Reading Type/Profile This is a chapter from the academic journal, Annals of the New York Academy of Sciences published by Wiley-Blackwell. This peer-reviewed, multidisciplinary journal focuses primarily on biomedicine and biology, but also includes psychology, anthropology, and philosophy fields of study. The publications serve to provide "…commissioned review, perspective, and commentary," articles on recent research.. This specific edition was published in 2003. Bibliographical Information: Peretz, I., Champod, A. S., & Hyde, K. (2003). Varieties of Musical Disorders. Annals of the New York Academy of Sciences,999(1), 58-75. Author Background: Dr. Peretz is a cognitive neuropsychologist and a professor of Psychology at the University of Montreal. As of 2005, Peretz has been the co-director of the international laboratory for Brain, Music, and Sound research (BRAMS). Her research is influenced by clinical studies, and involves a broad range of study. Other publications she has done involve perception, memory, and emotion in regard to musical performance. Her research focuses on the musical potential of ordinary people, its neural correlates, its heritability and its specificity relative to language. Her primary collaborator is Robert Zattore, who is a cognitive neuroscientist at the Brams lab. Source: Brams » Isabelle Peretz, PhD. (n.d.). Retrieved April 16, 2018, from https://www.brams.org/en/membres/isabelle-peretz/ Abstract: Within this paper, Peretz gives insight into the Montreal Battery of Evaluation of Amusia, a system of tests used for musical assessment in neuropsychological settings. The MBEA consists of six tests - contour, interval, scale, rhythm, meter, and memory - that provide insight into cases of congenital amusia and instances in which musical skills are lost in individuals after brain damage. The paper begins with providing a model of music perception and memory given a auditory input. Definitions are given, as well as the linkages between the processing components presented within the model. After these important processes have been presented, the details of the MBEA tests are given, as well as the results following a research study conducted by Peretz. The results suggest validity and reliability of the

MBEA. Furthermore, the MBEA is a tool to distinguish between melodic/pitch deficits and rhythmic deficits in individuals who experience amusia. The average normal performance was 90%, suggesting that individuals suffering from amusia were below this average, with a given cut off score of 78%. Important Details: Amusia refers to instances in which the ability to recognize musical tones and reproduce those tones is lost, either congenitally or consequent to brain insult. Sustained interest in these musical impairments is motivated by the fact that these disorders can be used to draw conclusions as to the framework of the musical functions in the normal brain. Aphasia is the loss of the ability to understand or express speech, caused by brain damage or inherited congenitally. Brain damage can selectively interfere with musical abilities while the rest of the cognitive system remains essentially intact, which means that Amusia is not a consequence of, or inherently related to Aphasia. AUDITORY INPUT The Melodic Organization of auditory input is defined by sequential variations in contour, interval, and scale. Within the melodic route, intervals serve as the gateway for perceiving musical pitch and allows for scale structures, musical keys, and tonal functions to be present. Contour is a curve or function that maps the perceived pitches of sounds in a length of melody over time. A scale is a collection of fundamental frequencies that are grouped by what "sounds good", which is culturally defined. People who have difficulties with melodic organization have issues with pitch and tone perception. The Temporal Dimension of auditory input is defined by sequential variations in rhythm and meter. Rhythm is the pattern of sounds as they move through time. Meter is the time division of recurring stresses and accents that provide the pulse of the music. People with difficulties in temporal organization have issues with recognizing a beat and temporal regularity. If the melodic route represents "what" than the temporal route represents "when" events occur in the auditory musical input. In the test results of 24 individuals with confirmed amusia, shown in the figure to the right, there is an apparent correlation between test scores on rhythmic and melodic tests. Repertoire in this context refers to a perceptual representation system based on long-term knowledge of musical phrases, which may be familiar to many other listeners in Western musical culture. MONTREAL BATTERY OF EVALUATION OF AMUSIA The MBEA contains six tests. Five of these tests involve melodies from a pool of 30 original songs composed within the Western tonal system. The tests consist of of a standard stimulus melody and numerous manipulations upon it involving violations of five parameters within the Western tonal system. These are contour, interval, scale, rhythm, meter, and memory tests. For example, in the scale test the manipulation consists of a scale-violated alternate melody created by modifying the pitch to be out of scale. All five tests use the same pool of thirty musical phrases that were composed within a Western tonal system. Subjects characterized the manipulated phrases as "same" or "different" than the standard stimulus melody. The Meter ID test is different than the other four because it involves two stimulus, one in duple meter and on in triple meter. Subjects are asked to categorize each as either a waltz or a march, This figure illustrates the composite scores of selfdeclared amusics and normal participants and includes a cutoff score of 78%. Scores lower than this indicate that subjects may have amusia which presumes that participants know that a waltz is in triple meter and a march is in duple meter. The sixth test is a memory recognition test. Participants who had heard the pool of thirty songs were asked to identify if they had heard a composition before from a mix of the 15 of the original compositions and 15 new compositions. The 15 new compositions were arranged along the same principles as the others but differed in their exact patterns. Some limitations to the MBEA include the fact that the tests may not take into account other musical difficulties that individuals may have apart from perception and memory. Additionally, the test may be overlooking the presence of "…theoretically interesting deficit," (Peretz). Apart from its limitations, the MBEA has been deemed valid, through the use of the Gordon's Musical Aptitude Profile tests, as well as reliable through the means of a testretest that was conducted.

Author Backgrounds 1 Jessica Phillips-Silver has a Ph.D in Development and Music Perception from the McMaster Institute for Music and The Mind, and Bachelor's degrees in Psychology and Music from Carnegie Mellon University. Her main topic of focus in her research is on the development of the mind, both for neurotypical people as well as tone-deaf, beat-deaf, blind, and deaf people. She currently is a fellow at Georgetown University Medical Center, in the Laboratory of Integrative Neuroscience and Cognition, where she currently studies sound and language processing. While she was at BRAMS, she studied the synchronization of dance movement with music. Petri Toiviainen is a Professor of Music at the University of Jyväskylä in Finland. He has written a book on modeling music cognition, and studies musical rhythm and movement. Nathalie Gosselin is an Assistant Professor with the University of Montreal, Department of Psychology. She studies the effects that music has on non-neurotypical people (i.e. people with learning disorders, psychiatric disturbances, etc.). Her work has shed light on how the brain comprehends musical emotions. Isabelle Peretz is a cognitive neuropsychologist and professor of Psychology the University of Montreal. She has a Ph.D in Experimental Psychology. Her research focuses on the musical potential of human beings, and how that potential can be optimized and obtained. She is one of the leading researchers on amusia. Olivier Piché is associated with the University of Montreal, Department of Psychology. He has previously worked on research with the other authors in this study. Abstract/Summary In this case study, Phillips-Silver et al. focus on amusia - specifically, beat deafness, which is an inability to feel the beat in music. To do this, they compared 33 controls to Mathieu, a participant who reported not being able to find the beat in music and scored below average on the beat sections of the MBEA. After conducting tests where Mathieu performed below the average of the controls on tasks that had him find the beat in music (but the same as controls on other tasks), Phillips-Silver et al. concluded that beat deafness occurs due to an impaired perception of beat separate from an impaired perception of tone, implying that beat deafness is a new form of amusia. 1 All author details pulled from their ResearchGate Profiles Research Question(s) How did Mathieu's synchronization response compare to a control group? If there was a deficit in beat synchronization compared to the control, is it due to the type of external physical manifestation of the beat, the tempo, or the type of music? Important Terms Beat Deafness refers to a phenomenon in which an individual fails to detect a beat, and as such, has difficulty dancing or "moving to the music". Prior to this study, beat deafness was not academically documented. However, other similar phenomena have been researched such as congenital tone deafness, a genetic disorder characterized by an inability or deficit to process musical pitch. Beat deafness can be congenital or it can be brought on by disease or injury. It is a distinct form of amusia, which includes tone deafness and pitch deficits. Methodology The researchers recruited 33 adults to be a in a control group and a 23-year-old student named Mathieu who reported that he felt he could not keep a beat. After running the Montreal Battery of Evaluation of Amusia (MBEA) on him to make sure that he did not also suffer from congenital amusia, specifically tone deafness, they asked Mathieu and the controls to bounce to the regular beat of a popular Merengue song, as well as to the beat of a metronome. A visual aid of the experimenter bouncing to the beat was also presented. To make sure that any deficit between Mathieu and the controls was not due to the physical activity of bouncing to the beat, the experimenters also had them tap to the beat of the Merengue and metronome. Other variations included adding various types of music to be bounced to and changing the tempo of the songs. In order to assess Mathieu's perceptual abilities separate from action, the researchers showed all participants various clips of a person bouncing either in sync or out of sync with the music. Results The experimenters found that Mathieu was able to phase- and period-lock with the metronome and when watching the experimenter bounce to the music but could not synchronize to the beat when bouncing to the music, even with a visual aid. This was also true when he was asked to tap the beat. However, he was able to bounce in regular intervals in silence. His inability to synchronize with the merengue generalized, for the most part, to other types of music as well. He was generally able to detect whether tempo decreased or increased, but his sensitivity to such change in music was lower than the controls; however, his sensitivity to change in tempo in a metronome beat was about the same as the controls. This pattern of results was about the same when asked to determine whether a bouncer in a clip was in or out of sync: when the clip was to music, his ability to detect minute asynchrony was lower than the controls but was about the same when the clip was to a metronome beat. Discussion The fact that Mathieu was unable to complete tasks that he normally would be able to when a musical processing component was added shows that musical processing occurs in several parts of the brain. The fact that Mathieu is able to perform one task but not another of two tasks that seem to be very intertwined suggests that beat and pitch are processed in different parts of the brain. This study is a good representation of the modularity of the mind, the idea that the brain is composed of modules that have collaborative distinct developed functions. Therefore, because Mathieu experienced difficulties in beat but not in pitch, music processing occurs in different parts of the brain. The music-specificity of beat deafness has yet to be confirmed. Future studies might include a metronome that replicates non 4/4 time in order to strip away all differences in pitch with complete regularity. It remains to determine the extent of the condition's focus on pitch and up- versus down-beats. The results from our single case study indicate that pitch deafness is distinct from beat deafness, but do not indicate a lack of association between the two.