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Emotion induction through music: a review of the musical mood induction procedure

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• **Abstract**

This article reviews research showing that music can alter peoples' moods and emotions. The so called "musical mood induction procedure" (MMIP) relies on music to produce changes in experienced affective processes. The fact that music can have this effect on subjective experience has been utilized to study the effect of mood on cognitive processes and behavior by a large number of researchers in social, clinical, and personality psychology. This extensive body of literature, while little known among music psychologists, is likely to further help music psychologists understand affective responses to music. With this in mind, the present article aims at providing an extensive review of the methodology behind a number of studies using the MMIP. The effectiveness of music as a mood-inducing stimulus is discussed in terms of self-reports, physiological, and behavioral indices. The discussion focuses on how findings from the MMIP literature may extend into current research and debate on the complex interplay of music and emotional responses.

Introduction

Music can arouse deep emotions in a listener, a fact that has intrigued many students of music and caused debate between music scholars. Currently, a large number of researchers from different disciplines investigate the structural and psychological determinants of musical emotion perception and induction (for an overview see Sloboda and Juslin, 2001). In addition, researchers in other disciplines than music interested in the interplay of cognition and affect have used music as a mean of inducing mood in research participants (Kenealy, 1988). The so called Musical Mood Induction Procedure (MMIP) is by now a standard mood induction method (Gerrards-Hesse, Spies and Hesse, 1994), and since the beginning of the 1980's more than 40 articles published in prestigious psychological journals have used this method. This extensive body of research is, however, not well known to music psychologists and theorists for two main reasons: (1) articles using the MMIP are

mainly published in journals other than music psychology journals, and (2) the MMIP is not the main dependent variable, but is used only as a peripheral method of inducing mood and therefore the role of music is downplayed. Nevertheless, this research may add to existing knowledge on emotion induction through music. The aim of the present article is to give an overview of the MMIP with special emphasis on emotion elicitation (music) and indicators of emotion induction (self-report, behavioral, cognitive, and physiological process). It is believed that the methodology and findings from the MMIP will be of interest and use to researchers interested in the interplay of music and emotion. The article begins with an introduction to the general methodology behind the MMIP. A review of music used in MMIP, and its effect on self-reports, behavior, and physiology then follows. In the final section, I discuss results from MMIP studies in relation to contemporary views on emotional reactions to music.

Before reviewing the MMIP a note on terminology is necessary. Traditionally, mood states have been defined as general, low intensity subjective feeling states that have no concrete object and a relatively long duration. An emotion is defined as more intense and short-lived, and has an event or object that is appraised as eliciting the subjective feeling state (Clore, Schwarz and Conway, 1994). Affective reactions have been used as a colloquial term encompassing mood, emotion, and feeling (see Scherer and Zentner, 2001). The distinction of these terms is troublesome, since different researchers have used different terms to describe the same process. Therefore, the present review will as much as possible use the terminology of the respective authors of the particular research reviewed.

Musical mood induction procedure

A wide variety of Mood Induction Procedures (MIPs) have been developed to aid researchers interested in how mood influence cognitive processes. Examples include hypnosis, imagery of emotional events, film, recollection of autobiographical memories, reading of affect-laden vignettes, task feedback, success/failure, and various variations on these themes (for overviews see Brenner, 2001; Brewer, Doughtie and Coyne, 1981; Martin, 1990; Gerrards-Hesse, Spies and Hesse, 1994; Goodwin and Williams, 1982; Marks and Hammen, 1982; Westermann, Spies, Stahl and Hesse, 1996). The by far most used MIP is the Velten method (Velten, 1968; for an overview see Kenealy, 1986). The Velten MIP is based on participants reading 60 self-referent statements. Participants in the "elated" condition read statements such as "This is great, I really do feel good", in the "depressed" condition "I have too many bad things in my life", and in the "neutral" condition "This book or any part thereof must not be reproduced in any form". The Velten MIP is mainly a cognitive mood induction that may have some unwanted effects (*e.g.*, cognitive priming) on some dependent variables (*e.g.*, learning). As a response to this a more

sensory MIP was developed, the Musical MIP (Clark, 1983). One of the benefits of the MMIP was that it should (compared to the Velten MIP) be relatively free of so-called demand characteristics (an issue we will return to later).

The original MMIP procedure was based on replaying mood-eliciting music to research participants. One of the first studies of the musical induction procedure (Sutherland, Newman and Rachman, 1982) allowed participants to choose between several different pieces of music. With the exception of a few reports, the bulk of subsequent studies have used the same piece of music for all participants in a specific mood condition. The original MMIP also contained instructions about how participants should go about obtaining the desired mood, but later studies have minimized such instructions (Pignatiello, Camp and Rasar, 1986). Typically the MMIP consists of three mood conditions; depressed, neutral, and elated. For this reason, music eliciting these specific moods have been employed. However, later studies have studied sad/negative or happy/positive music, why these terms will be used interchangeably throughout this article.

Some studies have directly compared the MMIP and Velten MIP and found that the MMIP is superior in many respects (Albersnagel, 1988; Clark, 1983; Kenealy, 1988). Other articles reviewing the effectiveness of several MIPs have concluded that the MMIP is among the most effective. Martin (1990) noted that the MMIP induced the desired mood more than 75% of times. She also concluded that the MMIP was especially efficient in inducing depressed and anxious moods, but inferior to other MIPs (such as Velten, social feedback, and social recollection) in inducing elated moods. In their overview and, later, meta-analysis, Gerrards-Hesse *et al.* (1994) and Westermann *et al.* (1996) however concluded that the MMIP were among the most successful MIPs.

Music used in the MMIP

• **Musical characteristics.** Early researchers using the MMIP (Clark, 1983) assumed that certain properties of the musical structure induce certain moods. Recent research indeed shows that there are structural properties that cause the listener to perceive certain emotional expressions in the music (for reviews see Gabrielsson and Lindström, 2001, and Juslin, 2001). In a review article of the effects of music on mood and consumer behavior, Bruner II (1990) outlined a number of propositions regarding the effects of music. Among these, Bruner argued, "The emotions perceived to be expressed in musical stimuli are capable of evoking corresponding affective reactions in the listener" (p. 100). With this in mind, Bruner then summarized various musical characteristics that are linked to emotional expressions on the basis of a number of studies (Gundlach, 1935; Hevner, 1937, Scherer and Oshinsky, 1977; Wedin, 1972). These are summarized in Table 1 (next page).

As may be seen in Table 1 (and more recently in Juslin, 2001) a number of "cues" in the musical structure may make listeners perceive and correctly identify a specific intended emotional expression.

Table 1

Musical characteristics and emotional expression of music (adapted from Bruner II, 1990, p. 100)

musical	Emotional Expression							
element	Serious	Sad	Fear	Serene	Humorous	Happy	Exiting	Majestic
Mode	Major	Minor	Minor	Major	Major	Major	Major	Minor
Tempo	Slow	Slow	Slow	Slow	Fast	Fast	Fast	Medium
Pitch	Low	Low	Low	Medium	High	High	Medium	Medium
Rhythm	Firm	Firm	Low	Flowing	Flowing	Uneven	Firm	Firm
Harmony	Cons	Diss	Diss	Cons	Cons	Cons	Diss	Diss
Loudness	Medium	Varied	Soft	Soft	Medium	Medium	Loud	Loud

However, perception of emotion in musical expression does not necessarily lead to the same emotion being experienced (see Gabrielsson, this issue, for a discussion of the distinction between emotion induction and perception). Researchers using the MMIP have generally had a less stringent criterion than Bruner II's proposition, namely that the music should induce and elicit mild and general positive and negative moods (like elation and depression) rather than specific emotions (sadness, happiness, fear, or majestic feelings). Nevertheless, the choice of music for MMIP studies have been guided by the idea that musical characteristics such as slow tempo, low pitch, and minor mode are associated with negative feelings and fast tempo, high pitch, and major mode are associated with positive feelings (Clark, 1983). In their choice of music, several researches have collaborated with or got help by music theorist/therapists. Table 2 shows musical selections used in 41 MMIP studies for the induction of positive, negative, or neutral mood.

Table 2

Musical selections for positive, neutral, and negative conditions in 41 studies employing the MMIP

Musical Piece	Study
Positive	
Alabama: "Tenenessee River"	Terazis (1993)
Bach "Brandenburger Concerto No. 2"	Mayer *et al.* (1990)
Bach "Jesu Joy of Man's Desiring"**	Balch *et al.* (1999)
Bachman-Turner Overdrive "Taking Care of Business"	Terazis (1993)
Beatles " Yellow Submarine"	Mecklenbräucker & Hager (1986)
Beatles "Obladi Oblada"	Mecklenbräucker & Hager (1986)
Copland "Appalachian Spring"	Stratton & Zalanowski (1991); Stratton & Zalanowski (1989)
Copland "Simple Gifts"	Stratton & Zalanowski (1991); Stratton & Zalanowski (1989)

David Byrne "Beleze Tropical, Brazil Classics 1"	Wenzlaff *et al.* (1991)
David Foster "Whatever We Image"**	Gorn *et al.* (2001)
Delibes "Coppélia"	Albersnagel (1988); Bouhuys *et al.* (1995); Clark & Teasdale (1985); Clark *et al.* (2001); Matthews & Bradley (1983); Lenton & Martin (1991); Mayer *et al.* (1990); Parrott (1991); Parrott & Sabini (1991) Sutherland *et al.* (1982); Teasdale & Spencer (1984); Willner *et al.* (1998);
Doldinger's Passport "Bale the Jack"	Mecklenbräucker & Hager (1986)
Expose " Come Go With Me"	Lewis *et al.* (1995)
Gluck "Orpheus and Eurydice"**	Balch *et al.* (1999)
Holst "The Planets: Venus - Bringer of Peace"	McFarland (1984)
Hubert Laws Jazz version of Bach's "Brandenburger Concerto"	Wood *et al.* (1990)
Irene Cara "Fame"	Lewis *et al.* (1995)
Jellowjackets: "And You Know That"	Terazis (1993)
Mariah Carey: "Emotions"	Terazis (1993)
Mozart " Eine Kleine Nacthsmusik; Allegro"*	Eich & Metcalfe (1989); Gorn *et al.* (2001); Martin & Metha (1997): Trambakolous (1997)
Mozart "Divertimento No. 136"	Eich & Metcalfe (1989)
Mozart "Overture to Marriage of Figaro"	Trambakolous (1997)
Mozart "Ronda all Turra"	Trambakolous (1997)
Mozart "Symphony No. 41"*	Balch *et al.* (1999)
Mozart "Toy Symphony"	Mayer *et al.* (1990)
Mozart "Violins etc."	Trambakolous (1997)
Mozart „Flute Concerto in D Major; Allegro"	Martin & Metha (1997)
New Order: "Bizarre Love Triangle"	Terazis (1993)
Rocky theme	Trambakolous (1997)
Sousa "The Stars and Stripes Forever"	Rogowski (1991)
Tchaikovsky "Mazurka from Swan Lake Ballet"*	Balch *et al.* (1999)
Tchaikovsky "Nutecracker Suite"	Parrott (1982)
Tchaikovsky "Swan Lake Ballet, op. 20; Mazurka)	Martin & Metha (1997)
Tchaikovsky: "Nutcracker Suite"	Terazis (1993)
Tim Weisberg "The Good Life"+	Mayer *et al.* (1990)
Vivaldi "Concerto No. 3 (autumn); Allegro	Martin & Metha (1997); Wenzlaff et al. (1991)
Yanni "Once Upon a Time"	Trambakolous (1997)

Neutral

Chopin "Waltzes No. 11 and No. 12"	Wood *et al.* (1990)
Debussy "la Mer: From Dawn until Noon on the Sea"	Martin & Metha (1997)
Debussy "Prélude l'Aprés Midi d'un Faun"	Albersnagel (1988)
Delibes "Coppélia" at half speed	Parrott (1991)
Dvorak "The New World"	Mecklenbräucker & Hager (1986)
Fauré "Ballad for Piano and Orchestra, Op. 19"	Albersnagel (1988); Shapiro & Lim (1989); Stöber (1997)
Holst "The Planets: Neptune - the Mystic"	McFarland (1984); Spies *et al.* (1991)
John Adam "Common Tones in Simple Time"	Heatherton *et al.* (1998); Wenzlaff *et al.* (1991)
Kraftwerk "Pocket Calculator"	Sutton *et al.* (1988)
Lefevre "Canon de Pachelbel"	Mecklenbräucker & Hager (1986)
Michel Hedges "Aeriel Boundaries"	Wood *et al.* (1990)
Mozart "Symphony N0 40 in G minor"	Stratton & Zalanowski (1989)
Reich "Variations for Winds, Strings, and Keyboards"	Martin & Metha (1997)

Negative

Albinoni "Adagio"	Eich & Metcalfe (1989); Martin & Metha (1997); Mecklenbräcker & Hager (1986); Spies *et al.* (1991)
Barber "Adagio pour Cordes"	Eich & Metcalfe (1989); Morrow & Nolen-Hoeksema (1990)
Beethoven "Piano Sonata No. 14"	Trambakolous (1997)
Beethoven "Symphony No. 3, Op. 93; Allegro Vivace"	Martin & Metha (1997); Stratton & Zalanowski (1991); Stratton & Zalanowski (1989);
Beethoven "Symphony No. 3; Marcia Funebre"**	Balch *et al.* (1999)
Beethoven "Synphony No. 4, Op. 60; Adagio-allegro Vivace"	Martin & Metha (1997)
Beethoven "Sonata No. 7"	Trambakolous (1997)
Bonnie Raitt: "I Can't Make You Love Me"	Terezis (1993)
Chopin: "Funeral March Sonata"	Terezis (1993); Trambakolous (1997)
Dvorak "Ninth Symphony"	Albersnagel (1988)
Eagles "I Can't tell you why"	Terezis (1993)
Fauré "Pie Jesu"	Trambakolous (1997)
Grieg "In the Hall of the Mountain King"*	Balch *et al.* (1999)
Grieg "Peer Gynt Suite"	Parrott (1982)
Hammerstein & Kern "Why Was I Born?"	Stratton & Zalanowski (1989)
Holst "The Planets: Mars - Bringer of War"	McFarland (1984); Spies *et al.* (1991)
Beethoven"Sonata Opus 10, No. 3"	Rogowski (1991)
Keith Jarrett "Spheres"	Wenslaf *et al.* (1991)
Kenny G: "Ester"	Terezis (1993)
Luther Vandross "Superstar"	Lewis *et al.* (1995)
Marcello "Adagio from Oboe Concerto in D minor"**	Balch *et al.* (1999)
Michel Colombier "Emmanuel"	Mayer *et al.* (1990)
Mohanam "Raga Bhopali"**	Gorn *et al.* (2001)
Mussorgsky "Nigh on Bald Mountain"*	Balch *et al.* (1999)
Naada Loludai "Saraseeruhasana"*	Gorn *et al.* (2001)
Pandit Dhimsen Joshi "unspecified Indian classical piece"*	Gorn *et al.* (2001)
Paradise Lost "Forever Failure"	Västfjäll (1997); (2002)
Prince "Sometimes It Snows In April"	Lewis *et al.* (1995)
Prokofiev "Russia under the Mongolian Yoke" at half speed	Clark & Teasdale (1985); Clark *et al.* (2001); Heatherton *et al.* (1998); Lenton & Martin (1991); Matthews & Bradley (1983); Mayer *et al.* (1990); Parrott (1991); Parrott & Sabini (1991); Sutherland *et al.* (1982); Teasdale & Spencer (1984); Wenzlaff *et al.* (1991); Willner *et al.* (1998); Wood *et al.* (1990)
Sibelius "Swan of Tuonela"	Albersnagel (1988); Bouhuys *et al.* (1995); Trambakolous (1997)
Sinead O'Connor: "Nothing Compares to You"	Terezis (1993)
Stivell "Renaissance of the Celtic Harp"	Mecklenbräucker & Hager (1986)
Stravinsky "The rite of Spring"	Albersnagel (1988); Shapiro & Lim (1989); Stöber (1997);
Willie Nelson: "Blue Eyes Crying in the Rain"	Terezis (1993)

* High arousal

** Low arousal

As can be seen in Table 2, a wide variety of musical pieces have been employed, including classical, rock, pop, and folk music excerpts. It may also be noted that a majority of studies have used classical music. Some studies have reported extensive pre-testing of other musical material in addition to the musical excerpt finally used in the MMIP, whereas other experiments unfortunately have omitted their choice of musical excerpts (Pignatiello *et al.*, 1986). As evident from Table 2, most musical excerpts have been used in single studies, but some musical pieces have been employed in several. For instance, 12 studies used Delibes' Coppélia to induce happy or elated moods (Albersnagel, 1988; Bouhuys *et al.*, 1995; Clark and Teasdale, 1985; Clark *et al.*, 2001; Lenton and Martin, 1991; Mayer *et al.*, 1990; Matthews and Bradley, 1983, Parrott, 1991; Parrott and Sabini, 1990, Sutherland *et al.*, 1982; Teasdale and Spencer, 1984; Willner *et al.*, 1998), whereas at most three studies used the same musical piece (Fauré's Ballad for Piano and Orchestra, Op. 19) to induce neutral mood (Albersnagel, 1988; Shapiro and Lim, 1989; Stöber, 1997). For induction of negative mood, 13 studies used Prokofiev's *Russia under the Mongolian Yoke* from the movie *Alexander Nevsky* played at half speed (Clark and Teasdale, 1985; Clark *et al.*, 2001; Heatherton *et al.*, 1998; Matthews and Bradley, 1983; Lenton and Martin, 1991; Mayer *et al.*, 1990; Parrott, 1991; Parrott and Sabini, 1990; Sutherland *et al.*, 1982; Teasdale and Spencer, 1984; Willner *et al.*, 1998; Wenzlaff et al., 1991; Wood *et al.*, 1990). Most likely, replaying the music at half speed is done based on the notion that slow tempo and low pitch is associated with negative emotions, but the ecological validity of this music appears to be limited. The fact that a number of studies used the same musical excerpts (even with the same modifications) seems to reflect two different strategies that a researcher may use when using the MMIP: either (1) adopt a methodology and stimulus material from a previous study and thus minimize cost in that pre testing is avoided, or (2) select new musical excerpts on the basis of similarity to previous studies or on the basis of hunches or assistance by musicologists or music therapists. For those studies opting for the first strategy, it appears as if the Clark and Teasdale (1985) and Albersnagel (1988) studies have been especially influential. As already noted, at least 13 studies used the music employed by Clark and Teasdale and five studies the music used in Albersnagel (1988).

Another rich source of information about mood responses to music is Capurso (1962), which studied if specific musical pieces could be associated with six different mood categories: (1) happy, gay, joyous, stimulating, triumphant; (2) agitated, restless, irritating; (3) nostalgic, sentimental, soothing, meditative, relaxing; (4) prayerful, reverent; (5) sad, melancholic, grieving, depressing, lonely; and (6) eerie, weird, grotesque. Capurso let 1075 students listen to 105 musical pieces intended to represent these categories, and asked them to indicate which of the mood categories they would choose to describe the effects of the music. In addition participants described the intensity of their response. Capurso compiled a list of 28 selections where the emotional strength and listener agreement of each piece is

described. Using the Capurso list as a guide, Rogowski (1991) selected Beethoven's Sonata Opus 10, No. 3 for the negative mood induction and Sousa's *The Stars and Stripes Forever* for the positive induction. Interestingly, Rogowski used non-musical stimuli (not from the Capurso list) for the neutral condition, *Mountain Retreat*, a recording of bird and insect sounds. Rogowski found that the positive induction differed from the negative and neutral on VAS and DACL scores, thus validating the mood-inducing effects of music from the Capurso list.

• **Number of pieces used.** The MMIP studies also differ in the number of musical pieces used during a mood induction session. The bulk of studies have used a single musical piece to induce a certain mood (Clark, Teasdale, Broadbent and Martin, 1983; Mathews and Bradley, 1983, Teasdale and Spencer, 1984). Beginning with Clark (1983), several studies have selected a single musical piece that is intended to create a specific mood in the listener. Some studies have even repeated the same musical piece during the course of a mood induction procedure (*e.g.*, Wood, Saltzberg and Goldsamt, 1990). Overall, these studies have been successful in inducing the intended mood (see the discussion below about self-reports).

Other studies have used a program of musical excerpts similar in mood-inducing qualities. For example, Shatin (1970) studied how music could influence moods from one end of a continuum to another by presenting research participants with music representing four different mood continua: sad-gay, restless-serene, bored-active, and active-majestic. Shatin concluded that the different musical continua were effective in inducing the intended moods, but objections may be raised because the response measure required participants only to check which of four continua the participant experienced, no control condition was included, and no mood measurement prior to the music commenced was included (Stratton and Zalanowski, 1989).

Similar to Shatin's methodology, Pignatiello *et al.* (1986) selected 45 pieces of music on the basis of pitch, rhythm, mode, loudness, melody, and tempo to represent positive (elated), neutral, and negative (depressed) moods. In a pilot experiment, four music theorists and four students (not trained in music) rated each musical piece on a scale from very depressing to very elated. On the basis of the ratings obtained in the pilot experiment, Pignatiello *et al.* constructed three different collections all starting with the same neutral piece: from neutral to elated, from neutral to depressed, and neutral-neutral. Participants were then required to listen to one of the collections consisting of 15 musical pieces. Pignatiello and others using the same selections have reported significant changes in self-reported mood and high discrimination between different intended moods (Durand and Mapstone, 1998; Adaman and Blaney, 1995). It appears as if both methods have pros and cons. Using a single musical excerpt seems more ecologically valid and may minimize the problem of multiple moods being induced (Polivy, 1980), but it may also be that a single musical excerpt is a too weak manipulation to actually alter the listener's

mood. Also the mood induction may require some time before it is successful in truly altering the listener's mood, why a single musical piece may be too short (Eich and Metcalfe, 1989). Multiple selections of music similar in mood-inducing qualities or emotional expression may help overcome this problem, but it is likely that musical pieces, even though they induce moods similar in valence, may induce somewhat different feeling states. For instance, Albersnagel (1988) used one musical piece, Stravinsky's *The rite of Spring* to induce anxious moods, and another, Sibelius' *Swan of Tuonela* to induce depressed moods. Both anxiety and depression are negative states but differ in arousal, where depression is low and anxiety high in arousal (Russell, 1980; see the section on self-reports for a further discussion on the role of arousal in MMIP studies).

• **Instrumental music versus music with lyrics.** Most MMIP studies to date have used instrumental music, but there are studies that used music containing lyrics (Mecklenbräucker and Hager, 1986; Lewis *et al.*, 1995; Trambakolous, 1997). The effectiveness of the MMIP is most likely affected or primed by the affective content of lyrics, why special care must be taken when using such music. A study by Stratton and Zalanowski (1994) attest to the drastic impact lyrics can have on mood induction. They presented participants with either the music or the lyrics or the music and lyrics of the ballad *Why was I born* by Hammerstein and Kern. The melody was played on piano in a slow tempo (about 40 bpm). The lyrics were "Why was I born? Why am I living? What do I get? What am I giving? Why do I want a thing I daren't hope for? What can I hope for? I wish I knew. Why do I try to draw you near me? Why do I cry? You never hear me. I'm a poor fool, but what can I do? Why was I born to love you?". Participants rated positive affect and depression using the Multiple Affect Adjective Check List — Revised (MAACL-R), and change scores before and after listening were calculated. Significant differences between the three conditions were found. Participants listening to music only became slightly positive and less depressed. Participants listening to the lyrics were quite depressed, whereas participants listing to the lyrics plus music rated themselves as very depressed. From this, Stratton and Zalanowski concluded that lyrics had a larger effect on mood than music. In additional experiments, increasing the tempo or changing the valence of the lyrics did not change the results. Stratton and Zalanowski interpret these results as suggesting that lyrics provide a cognitive content or priming (somewhat like the Velten MIP), whereas music can amplify the intensity of the mood (*i.e.*, if it is consistent with the lyrics). Similar conclusions have been reached by Galizio and Hendrick (1972) who showed that folk song accompanied by guitar had a larger effect on mood than the song alone. Clearly, these findings point to the importance of considering the content of lyrics and its effect on mood.

In studies on emotional expression in music, a common methodology is to have the same musical piece played by a performer or synthesized in different expressions

(see Juslin, 2001). It is now known that listeners are rather good at recognizing the intended expression. The effect of such manipulations on mood is, however, much less researched. A few studies have looked at the role of tempo and mode (Balch and Lewis, 1996; Hinn, 1996). Hinn (1996) used a single melody line (no indication of music) that differed in mode (major/minor) but that was identical in pitch, tempo, and loudness. Unfortunately, Hinn used only a behavioral measure (free recall of learned material) and not self-report measures, and no difference between the major and minor MMIP was found. However, given the effectiveness of MMIP in inducing positive moods using music in major mode and negative moods by using music in minor mode it seems plausible that self-reports, if included, could have picked this up. Balch and Lewis (1996) recorded excerpts of Rondo and a piano sonata in C major by Mozart and *Jazz Holiday* by Nevin in either slow (60 bpm) or fast (140 bpm) versions. In addition, timbre (or musical instrument) was varied for the same excerpt (piano or brass). Participants made pleasantness and arousal ratings of their reactions to the musical pieces. Balch and Lewis found that tempo affected arousal ratings with higher arousal ratings for higher tempo. No effect on pleasantness ratings was found. The notion that tempo is related to the arousal dimension of mood experiences is congruent with findings from studies of emotion perception and expression in music (Juslin, 2001).

• **Individual differences and preference.** A problem in MMIP studies is that not all participants are affected in the same way by the music. For example, within the same experiment, some participants report being highly affected by the manipulation, whereas others remain unaffected. It has been noted elsewhere that emotional reaction to music is an individualized process, which also makes it highly difficult to study (Gabrielsson, this issue). In an attempt to overcome this, some researchers have used programs of music participants can choose from (Sutherland *et al.*, 1982) or created different MMIP for different musical tastes (Terezis, 1993).

Terezis (1993) created 12 different musical programs (for induction of positive and negative mood) for six individual musical tastes (examples of music within parenthesis; negative MMIP first, positive MMIP second): Classic rock (Neg: Eagles, *I Can't tell you why*, Pos: Bachman-Turner Overdrive, *Taking Care of Business*); Classical (Neg: Chopin, *Funeral March Sonata*, Pos: Tchaikovsky, *Nutcracker Suite*); Country (Neg: Willie Nelson, *Blue Eyes Crying in the Rain*, Pos: Alabama, *Tenenessee River*), Jazz (Neg: Kenny G, *Ester*, Positive: Jellowjackets, *And You Know That*); Popular-Soul: (Neg: Bonnie Raitt, *I Can't Make You Love Me*, Pos: Mariah Carey, *Emotions*); Progressive (Neg: Sinead O'Connor, *Nothing Compares to You*, Pos: New Order, *Bizarre Love Triangle*). In a pilot experiment participants were first asked to complete a musical preference checklist. Later, without participants knowing it, they would receive either negative or positive MMIP from the first or second musical preference. On basis of the preference measure, 32 participants received the classic rock MMIP, 27 the popular soul MMIP, and 11 the progressive

MMIP. However, only seven and six participants, respectively, had indicated that Classical and Country MMIPs would fit their preferences. The only significant effect on the pre-post induction MAACL measure was obtained in the Classic rock negative mood condition. It is likely that genre preference may compete with and counteract the effects of the MMIP, especially for induction of negative mood. Since all participants received the genre of music that they preferred, their moods might have been positive regardless of mood condition. Similarly, in the positive mood condition, negative effects may have been obtained because participants received a piece that they dislike, even though it was in a genre of their preference.

Rogowski (1991) noted that letting participants have a choice of stimuli as in Sutherland *et al.* (1982) study is associated with some problems. Sutherland *et al.* asked participants to choose one of several pieces that would be most effective in changing their mood in the desired direction. After choosing music, participants can either respond to the music in the expected direction or be in a position of having to explain why they were unable to predict their own responses to a familiar stimuli. Therefore participants may find it easier to alter their responses in order to maintain consistency between their previous judgment and actual response.

In attempts to make the MMIP more effective, some studies allowed participants to select and bring their own music (Carter, Wilson, Lawson and Bulik, 1995; Panksepp, 1995). In a comparison of a standard MMIP using the same music for all participants with a modified MMIP allowing participants to bring their own music, Carter *et al.* (1995) showed that the modified MMIP was significantly more effective (it influenced more participants and more intense moods were recorded) than the standard version. However, as noted above, letting participants use their favorite mood music causes problems in experimental control and manipulation. Even though specific moods may have been induced in participants, a number of cognitive and emotional processes not linked to the music may have caused that (memories etc). It has been demonstrated that various cognitive processes may be initiated by music. Lenton and Martin (1991) used the MMIP, as described by Clark and Teasdale (1985), but in addition let participants note what mental process or strategies they used to get into the mood. Lenton and Martin (1991) found that one third of the 64 participants recalled past events, 20 per cent imagined future events, 8 per cent engaged in mood-related facial expression, 12 per cent sang, hummed, or tapped their feet, 9 per cent moved or kept very still, and 14 per cent used imagery not related to the self. Clark (1983) described similar strategies. In addition to the strategies mentioned by Lenton and Martin (1991), Clark (1983) lists the following: sighing, indulging in fantasies about death, intensifying an already existent headache, curling up into a ball, and dancing. Similarly Parrott and Sabini (1991) found that participants in their experiment thought about actual past events (61%), let themselves into the music (27%), invented movie scenes (15%), and thought about aspects of their current life (15%). Further, participants used more than one strategy as indicated by the per cent figures. These findings suggest

that the mood ostensibly elicited by music generates, or is associated with, various non-musical psychological processes. As will be discussed further below, the MMIP has been criticized for being "less musical" than the name implies. Before that a discussion of the effect of the MMIP on self-reports, behavior, physiology, and cognitive processes is needed.

Effects of music

MMIP studies have used different measures of success, including self-reports, behavioral, cognitive, and physiological measures (Clark, 1983). These measures have been used to establish that the intended mood indeed was induced. Some studies have included measures from different measurement modalities, such as combinations of self-report and behavioral measures of self-report and physiology. In addition to such measures most researchers have included other dependent variables of interest for the particular study.

Self-reports

• **Self-report scales.** Self-reports obtained on various sorts of rating scales is by far the most used mood manipulation check in MMIP studies. Researchers have differed in their use of scales. Some used standardized mood measures, such as the Multiple Affect Adjective Check List (MAACL), Depression Adjective Check List (DACL), or short measures such as the Affect Grid, whereas other researchers have used Visual Analogue Scales (VAS) anchored by some mood adjective. Often mood is measured prior to and after the music manipulation, so that a change score can be calculated for each participant (*e.g.*, Lenton and Martin, 1991). Other studies have sampled mood on several occasions across the experimental procedure (Albersnagel, 1988). However, as will be discussed later, mood measurements are sensitive to a number of biases. Therefore, some studies have omitted manipulation checks (Balch, Myers and Papotto, 1999).

Among the standardized mood measures, the MAACL in its original and revised form (Zuckerman and Lubin, 1985) has been popular (Kenealy, 1986), but other measures have been used also. Typically these adjective checklists consist of a large number of adjectives that are summarized into index variables reflecting an overall mood quality. Since the MMIP is used in many studies on depression, many studies have included measures of this and related moods as well as moods at the other end of the continuum, such as elation. Other studies have measured the valence and arousal of mood using the Affect Grid or similar scales (Russell, Weiss and Mendelsohn, 1989). Among studies using rating scales such as the VAS (a 0-100 mm line scale anchored by unipolar adjectives), a large number of adjectives have been used tapping negative and positive mood (see for example Albersnagel, 1988).

The reason for including multiple scales has often been to test the specificity of the mood induction (*e.g.*, Albersnagel, 1988). Izard (1972) suggested that the experience of one emotion/mood often gives rise to another mood that amplifies, attenuates, or in any other way interacts with the original state. Similarly, Polivy (1981) noted that many MIPs give rise to the induction of multiple moods or emotions. Polivy noted that especially negative emotions such as depression, anxiety, and hostility tend to co-occur with the target emotion. In contrast to this, Blaney (1986) and Martin (1990) suggested that the MMIP was specifically suited to induce depression and elation without affecting other closely kindred emotions. In agreement with this, a number of studies have shown that the MMIP indeed affects only depression or despondency, but not anxiety scores (Parrott, 1991; Parrott and Sabini, 1990). Albersnagel (1988) even attempted to induce both anxiety and depression with two different musical pieces.

• Effectiveness. Studies also differ in the way they analyze the effectiveness of the mood manipulation. Some researchers have designed their experiments to include pre and post induction measures (Gerrards-Hesse *et al.*, 1994). On the basis of these two measurement points a statistical test can determine the effectiveness of the manipulation at a group level. However, not all participants are affected in the same way by the MMIP. Therefore, some researchers have calculated a change score by taking the pre induction ratings minus the post induction ratings (Rogowski, 1991). Change scores also preclude any possible differences in initial mood (pre manipulation) between participants. Furthermore, change scores may allow the experimenter to find and retain only those subjects who report being genuinely affected by the MMIP. Albersnagel (1988) constructed true score estimates based on confidence intervals for each mood scale. Using these confidence limits, only 23 out of 69 (33%) participants showed a substantial mood change in the expected direction. Using a similar methodology Boyhouys *et al.* (1995) found that 11 out of 24 participants reported considerable mood changes. Further studies using similar methodologies (for an overview see Clark 1983) have reported success rates from 87% to 100%. Other studies have used a somewhat different strategy in determining the effectiveness of the MMIP. Rather than individual analyses, self-report ratings have been compared among groups (Kenealy, 1988). Using this approach, several studies have documented large between-group differences between depressed, elated, and neutral mood.

Table 3 gives a summary of the results for 26 studies using these different approaches. The table shows the mood measure used, significant (at $p < .05$) individual mood change for positive, negative, and neutral manipulations (if included in the study), and significant between-group comparisons (if included). For the within-individuals result (P) denotes comparison between pre and post measure for positive induction, (N) for negative induction, and (Ne) for neutral induction. For the between-groups comparison, the (N-P) denote negative-positive, (P-Ne) positive-

neutral, and (N-Ne) negative-neutral induction comparison. The symbols used in Table 3 are used as follows: The symbol (≠) indicates significant difference ($p. < 05$) between pre or post induction rating or group means; (=) No significant difference ($p. > 05$) between pre or post induction rating or group means (note that for within comparisons in the neutral condition = is the expected outcome indicating that the experiment was successful in inducing a neutral mood); (-) comparison/analysis not included.

Table 3
Summary of selected MMIP studies using self-reports

		Results[b, c]					
		Within individuals			Between groups		
Study	Measure[a]	P	Ne[d]	N	P-N	P-Ne	Ne-N
Adaman & Blaney (1995)*	VAS: Pos, Neg	=	=	≠	≠	=	=
Albersnagel (1988)	VAS: Dep.; Anx.; Host.; Ela.	≠	=	≠	≠	=	=
Balch *et al.* (1999)	Affect Grid	-	-	-	≠	-	-
Bohuys *et al.* (1995)	VAS: Dep.; Anx.; Host.; Ela.	-	-	-	≠	-	-
Clark & Teasdale (1985)	VAS: Desp. Hap.; Anx.	≠	-	≠	≠	-	-
Clark *et al.* (2001)	VAS; Dep.; Anx.; Bor.; Ela.Desp. Anx.; Ang	≠	=	≠	≠	-	-
Eich & Metcalfe (1989)	Affect Grid	≠	-	≠	≠	-	-
Gorn *et al.* (2001)		-	-	-	≠	-	-
Heatherton *et al.* (1998)	Pos & Neg Affect	-	-	-	-	-	≠
Kenealy (1988)*	MAACL, Hap. Exh; Sad;	-	-	-	≠	=	≠
Lewis *et al.* (1995)	MAACL-R	≠	-	≠	≠	-	-
Martin & Metha (1997)	MAACL-R	-	-	-	=	-	=
Mayer *et al.* (1990)	Mood scale (Hap. Sad)	≠	-	≠	≠	-	-
Parrott & Sabini (1990)	VAS; Sad., Hap.; Anx.;Unc.	≠	-	≠	≠	-	-
Parrott (1991)	VAS; Sad., Hap.; Anx.;Unc.	≠	-	≠	≠	-	-
Pignatiello *et al.* (1986)*	DACL	-	-	-	≠	≠	=
Rogowski (1991)	DACL, VAS: Pos, Neg	≠	=	≠	≠	=	≠
Stratton & Zalanowski (1989)	MAACL	=	=	=	≠	≠	≠
Stratton & Zalanowski (1991)	MAACL	-	-	-	=	=	=
Stöber (1997)	STAI	-	-	-	-	-	≠
Terezias (1993)	MAACL	-	-	-	-	-	≠
Trambakolous (1997)	VAS: PA, Dep.	≠	-	≠	-	-	-
Willner *et al.* (1998)	VAS: Alert; Content; Calm	-	-	-	≠	-	-

Wood *et al.* (1990)	VAS: Hap., Sad	-	-	-	≠	=	≠
Västfjäll (1997)	VAS: Hap., Sad	-	-	≠	-	-	≠
Västfjäll (2002)	VAS: Hap., Sad.	-	-	≠	-	-	≠

* No indication of music used

[a] First abbreviation is type of measure (VAS: Visual Analogue Scale, MAACL: Multiple Affect Adjective Check List, DACL: Depression Adjective Check List; STAI: State- Trait Anxiety Inventory). Second abbreviation is type of adjective/measure included (Hap. = Happiness, Sad. = Sadness, Anx. = Anxiety, Unc = Uncertainty etc.)

[b] For the within individuals result (P) denotes comparison between pre and post measure for positive induction, (N) for negative induction, and (Ne) for neutral induction. For the between-groups comparison the (N-P) denote negative-positive, (P-Ne) positive-neutral, and (N-Ne) negative-neutral induction comparison.

[c] The symbol (≠) indicate significant difference (p .<05) between pre or post induction rating or group means; (=) no significant difference (p .>05) between pre or post induction rating or group means; (-) comparison/analysis not included.

[d] Note that for within comparisons for the neutral condition = is the expected outcome indicating that the experiment was successful in inducing or maintaining a neutral mood.

As can be seen in Table 3, of the studies reported, 27 of 30 mood scores for pre- and post-induction measures were significant. For the between-group comparisons reported in Table 3, 25 of 40 were significant. For the comparison of positive-negative MMIP, 18 out of 20 comparisons were found to be significant. These findings are in line with other overviews (based on 20 MMIP studies) showing that on average 75% to 89% per cent of the between-groups comparisons are found to be significant with the MMIP (Gerrards-Hesse *et al.*, 1994).

These findings also agree with early MMIP studies such as Clark (1983) and Clark and Teasdale (1985) that showed that participants given depression MMIP responded with greater despondency, anxiety, and sadness than did participants in the neutral and elation conditions. Later studies such as Parrott and Sabini (1991) noted marked differences between "happy" and "sad" music on ratings scales tapped by adjectives such as "sad", "happy", "anxious", and "confused". Participants in Parrot's (1991) experiment exhibited both significant change following mood induction as well as between-group differences following different MMIP manipulations. Similarly, Stratton and Zalanowski (1989) used change scores rather than raw scores as input to their between-group analyses.

Not only the valence component (positive/negative) of mood is affected by the MMIP. Other studies that have measured the arousal component in addition to mood valence have found reliable effects of these manipulations. Gorn *et al.* (2001) found that it was possible to choose music to elicit pleasant-high arousal, pleasant-low arousal, unpleasant-high arousal, and unpleasant-low arousal moods. These findings go counter to the notion that the MMIP procedure is depression-elation specific, and are consistent with the notion that the mood elicited by the music

depend on the emotion-eliciting properties in the music rather than the procedure itself. In addition, it is likely that most studies finding effects on self-reports of depression and elation would obtain effects on both valence and arousal ratings since the two moods differ on both dimensions of experience (elation is pleasant high arousal, depression unpleasant low arousal).

Even though a number of studies show marked individual change scores or statistically determined effects of between-group manipulations, some studies have failed to find effects on self-reports. For instance, Martin and Metha (1997) used the MAACL-R to assess the effectiveness of the MMIP and found no between group effects (positive, negative, and neutral conditions) for neither the depression nor the positive affect subscale (but they did find an effect of the manipulation on their dependent measure).

In order to make sure that all participants are affected by the MMIP and avoid loss of observations, Eich and Metalfe (1989) devised a specific procedure. They instructed participants to continue the MMIP until they reached a predetermined mood level (2 or -2 on a 4 to -4 scale). Every fifth minute the participants rated their mood on the affect grid while the music was replayed. When the participant reached the predetermined mood level (after considerable time in some cases) the experimental task (item generation) commenced and the MMIP was over. Even though Eich and Metcalfe did not tell their research participants that their experimental task (item generation) was contingent on their reaching a certain level of happiness or sadness, it may be questioned how this procedure influenced participants' behavior. Not only Eich and Metcalfe's experiment, but all MMIP studies using self-reports need to consider the effect of demand characteristics and instructions for participants on how to obtain the (by the experimenter) desired mood.

• **Demand characteristics.** Demand characteristics can be defined as the total sum of cues that convey an experimental hypothesis to the participant and therefore become significant determinants of the participant's behavior (Orne, 1962). In MIPs, such as the Velten, it is not unlikely that the participant can perceive the research hypothesis (*i.e.*, change of participant's mood). In fact, the Velten procedure has been heavily criticized because of this (*e.g.*, Kenealy, 1986; Polivy and Doyle, 1980). One of the very reasons the MMIP was developed was because it should (compared to the Velten MIP) be relatively free of demand characteristics, since it is a sensory rather than cognitive MIP (Clark, 1983; Pignatiello *et al.*, 1986). However, the MMIP has not escaped the same type of criticism as the Velten MIP has been exposed to.

• **Differential effects of instructions.** One problem with the original MMIP is that the procedure requires the participants to use the music as a background to their own efforts in obtaining a mood. It is stressed that the music by itself will not

automatically induce the desired mood state and that they should try really hard to get into the mood, using whatever means they find most effective (Clark, 1983). As already noted, participants exposed to the MMIP use various strategies to reach and maintain the desired mood. Clark (1983) even concluded, "[...] it is unlikely that either (the Velten or the Musical induction procedures) will have a marked effect on mood unless subjects are instructed to work at getting into the desired mood" (p. 46). Following the overview of Clark, a large number of studies have used explicit instructions (Albersnagel, 1988; Brewin and Harris, 1985; Brown and Mankowski, 1993; Clark and Teasdale, 1985; Eich and Metcalfe, 1989; Sutton *et al.*, 1988). Clark (1983) and Clark and Teasdale (1985) were, however, aware of the problems of demand and included an additional check of the authenticity of the moods in a post-experimental questionnaire. Participants were asked to "report honestly whether or not they felt their mood had changed in the desired direction" (Clark, 1983, p. 43). On this question 87% of the participants reported that their mood had indeed changed.

Others have argued that no explicit instructions are needed and experimentally shown that the music in itself may significantly alter mood (see Eifert *et al.*, 1988; McFarland, 1984; Wenzlaff *et al.*, 1991; Wood *et al.*, 1990). Pignatiello *et al.* (1986) were aware of the threat to validity in using explicit instructions, and used a cover story to remedy this problem. They merely instructed the participants that questions concerning the music would later be asked and that they thus should listen carefully to the music. No explicit instructions to change mood were given. As discussed earlier, significant differences between positive and negative MMIP were still obtained. Other studies have successfully used similar cover stories, telling the participants that they are participating in two different experiments, one on "music appreciation" (the MMIP) that is unrelated to the second experiment (the dependent variable in the specific experiment) (Siemer, 2001). Still others have included post-experimental questionnaires asking participants about their beliefs about the hypothesis of the study. The participants mentioning the correct hypothesis are then eliminated from the final sample (Pignatiello *et al.*, 1986; Terezis, 1993). In spite of these attempts, it is still impossible to rule out the existence of demand characteristics. For instance, that participants do not indicate an awareness of demand in a post-experimental questionnaire does not mean that they did not respond to demand during the experiment (Buchwald, Strack and Coyne, 1981).

Lenton and Martin (1991) directly assessed the effect of instructions *vs.* music in an experiment where participants in depressive and elative conditions were either given the standard instructions from Clark (1983) or no instructions. The effectiveness of the manipulations was assessed by both self-reports and behavioral measures (taken from Clark, 1983). The music was taken from Clark and Teasdale (1985). Using planned contrast, Lenton and Martin (1991) compared the effect of instructions, and the effects of music in presence and absence of instructions. The only significant effect was obtained for the instruction contrast. From this Lenton and Martin

argued that the effects of the MMIP is solely due to instructions and have little to do with music. Lenton and Martin conclude "The MMIP seems to be much less musical than the name implies" (p. 623). However their data do not warrant this conclusion. Using a mood-change criterion of a minimal 20 point difference between pre- and post mood measures (Teasdale and Fogarty, 1979), it was found that 75% (positive induction) and 87.5% (negative induction) of the participants met this criteria in the no instructions group, whereas the corresponding numbers for the instruction group was 31.2% (positive) and 57.8% (negative), respectively.

Kenealy (1988) reached a conclusion opposite to that of Lenton and Martin (1991). To test the effect of instructions, Kenealy used a methodology similar to that employed by Velten (1968) and Polivy and Doyle (1980), in which two additional groups are added to the no instruction MMIP; demand and counter demand: In the demand group participants are explicitly informed about the research hypothesis. If they react to these cues they are expected to differ from the no demand condition. In the counter-demand condition participants were instructed that people generally feel the mood opposite to the intended mood. Kenealy argued that if demand characteristics were responsible for the mood change participants listening to happy music with a sad demand instruction would report themselves as sad. Measurements were made in the form of both self-reported moods and behavioral measures (*i.e.*, distance approximation, writing speed, decision time, and word association). The results showed that happy and sad moods could be induced without instructions (significant differences in five of 9 self-report measures and all four of the behavioral measure). Further, the demand groups did not differ from the no instruction groups, and the counter-demand did not show the reverse mood ratings that were expected. Kenealy thus concludes that the MMIP is relatively free from explicit demands. Unfortunately, Kenealy's study is associated with some problems. For example, only 35 participants were allocated to the seven conditions; hence the results indicating no effects (*i.e.*, tests of null hypothesis) must be interpreted with caution.

Mayer *et al.* (1990) used a similar strategy and compared a standard MMIP (with instructions) with various modified MMIPs that either gave no instructions to participants or instructed participants to change but not maintain their moods. From pre- and post-induction measures, they found that all MIPs resulted in significant mood changes. However, the no instruction MMIP produced weaker mood effects than did all other MMIPs that contained some kind of instruction.

Parrott and Sabini (1990, Exp. 3 and 4) examined the role of MMIP instructions in two different experiments. In the first experiment, the standard MMIP was used. Participants were instructed to get in a sad or happy mood and to sustain it during the course of the experiment. It was stressed that the music would not automatically do this, and that the participant could use any technique he or she found suitable. The experimenter even mentioned various strategies the participant could use: listening to the music, getting into the music's beat, and altering their posture. Strong effects for sad *vs.* happy mood were found on self-report measures and on

mood-congruent recall. In the next experiment, Parrott and Sabini used the same procedure with the exception of changed instructions. This time participants were not instructed about the mood changing part of the experiment, neither was mood ever mentioned. They were instead instructed that they were to rate auditory material, and several filler tasks (semantic differential tests) were interleaved with the real experimental task (recollection of personal memories). Again, strong effects on both self-reports and the dependent variable (mood-dependent memory) were found. Thus, Parrott and Sabini (1990) concurred with Kenealy that the "subtle MMIP" is as efficient as the "explicit MMIP" in inducing the desired moods. Even though Parrott and Sabini ascribed music, rather than cognitive instructions, the role of mood changer, they note that the MMIP is not free of cognitive priming since their participants used different strategies in obtaining the mood regardless of instructions.

The fact that cognitive processes are elicited in the MMIP was experimentally examined by Stratton and Zalanowski (1991). They argued that mood responses to music are indeterminate and flexible. To test this assumption they devised a procedure in which participants were asked to elaborate happy, sad, or neutral stories from the scenes of either pleasant, neutral, or unpleasant paintings while listening to music (positive, neutral, or negative). Stratton and Zalanowski thus expected the story instructions to have a larger effects on mood than music. They found that paired with neutral story instructions, the music determined the mood change. However, happy and sad story instruction superceded the effects of the music.

Heatherton *et al.* (1998) studied the effect of labeled *vs.* unlabeled negative and neutral mood induced by the MMIP. All participants were instructed that music would be used to put them into a specific mindset necessary to perform a perceptual task. In the unlabeled mood condition, participants were told that the music was used to create an equal perceptual set in all participants. In the labeled mood condition, the experimenter told participants that some people had mentioned that the music made them feel "sort of down". The results showed a significant effect of the music manipulation, but also an interaction of the music manipulation with the label manipulation. In the unlabeled condition, sad music lowered overall mood more than did neutral music, but for the labeled condition no differences were obtained between sad and neutral music. Thus, instructions "corrected" rather then amplified the mood-inducing influence of music.

In an attempt to de-bias the effects of instruction within the same experimental session, Parrott (1991) exposed participants to the standard MMIP with instructions to sustain mood throughout the session. In contrast to the usual procedure, after post induction ratings Parrot told the participants that the experiment dealing with mood modification was over, and that they could stop sustaining their moods. Parrott argued that if instructions would cause mood effects, then the instructions to stop would not lead to mood-congruent recall in an incidental recall task.

However, participants showed strong mood-congruent recall (positive participants recalled more positive events, and negative participants more negative). Thus, Parrott concluded that demand characteristics or subject compliance were not viable explanations for the effects of the MMIP.

• **Persistence of induced mood.** Parrott's experiment raises another important question: How long is the MMIP induced mood maintained (without instructions)? Some researchers have argued that MMIP effects are rather short lived, ranging from 5-40 minutes (Isen, 1984; Martin, 1990). The standard MMIP often introduces a "mood booster" by replaying the musical piece one or several times during the experimental session (Clark, 1983). Others have used the music as a background context. Eich and Metcalfe (1989) used this so called "continuous" MMIP. The Eich and Metcalfe study provides some insight into the dynamics of mood response during music (for an overview of continuous ratings for emotional expression in music, see Schubert, 2001). They measured participants' mood using the affect grid during various points of an experimental session in which the same musical piece was repeated throughout the whole session. Figure 1 shows pleasantness and arousal ratings for three of these points during the course of Eich and Metcale's experiment.

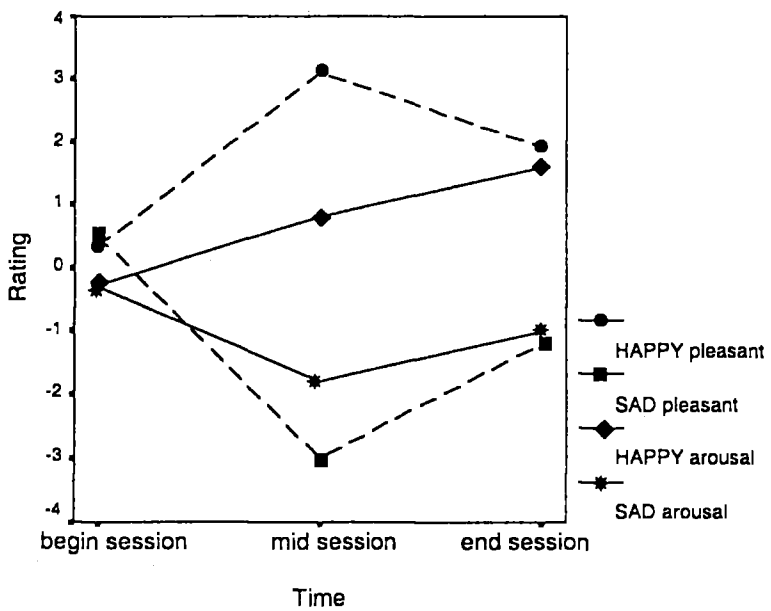

Figure 1.

Pleasantness and arousal ratings for happy and sad MMIP as a function of measurement time (beginning of session, mid-session, and end of session) in Eich and Metcalfe's (1989) experiment. Capital letters denote type of mood induction (happy or sad), lower case letters indicate measurement scale (pleasantness or arousal). (Adapted from Eich and Metcalfe, 1989).

As may be seen, pleasantness and arousal ratings varies considerably with measurement time. For the positive (happy) MMIP, it may be noted that both pleasantness and arousal ratings initially increase (from the beginning to the middle of the experimental session), but that pleasantness then again decreases (from the middle to the end of the experimental session). Similarly, a drop can be noted for pleasantness and arousal ratings in the negative (sad) MMIP in the first part, but with an increase in the later part of the experiment. So even though participants listen to the same musical piece several times, their reactions differ depending on measurement time. The fact that the positive MMIP initially was effective in inducing pleasantness but then drops, and that the negative MMIP initially was effective in inducing unpleasantness but then returns toward baseline may be a indication of hedonic adaptation. The initially happy (or sad) music piece may make individuals initially feel happy (or sad), but after repeated exposure and some time both musical familiarity and affective adaptation will modulate the mood response toward baseline. There is no indication of the length of the experimental session in Eich and Metcalfe (1989), but they note that they repeatedly recorded the same musical piece on both sides of a 45 min cassette in order to not influence the MMIP by having to rewind the tape. Therefore it is possible that participants listened up to 90 minutes to the same musical piece. The musical pieces that Eich and Metcalfe employed were about 7 minutes in length, meaning that some participants may have listened to the same musical piece almost 13 times.

For the standard MMIP that does not repeat the music, several studies have measured self-reported mood during the experimental session. Albersnagel (1988) had participants report their mood on four different occasions: baseline, before MMIP, after MMIP, and at the end of the experimental session. Figure 2 (next page) shows the ratings from elation (ELA) and anxiety (ANX) MMIP inductions measured on depression (dep), anxiety (anx), and elation (ela) VAS scales in Albersnagel's experiment.

As may be seen, participants' self-reported mood vary somewhat depending on measurement time. Initially, participants in the two mood conditions (ELA *vs.* ANX) report similar levels of anxiety, depression, and elation. However, following the ELA MMIP participants report higher elation and less anxiety than do participants receiving the ANX MMIP. Interestingly, for both mood conditions, self-reports tend to approach baseline again at the end of the experiment.

These data are not a function of the music only but also the experimental task, but they emphasize an important point for MMIP research: the effects of a mood manipulation are not stationary and stable even over the relative short duration of an experimental session. This is a problem for most MIP research, but could also generate some interesting future studies. For instance, using methods such as those described by Schubert (2001, see also Schubert, this issue), continuous assessment of the intensity of mood response during and after music could be obtained. Together with non-verbal measurement methods, such as

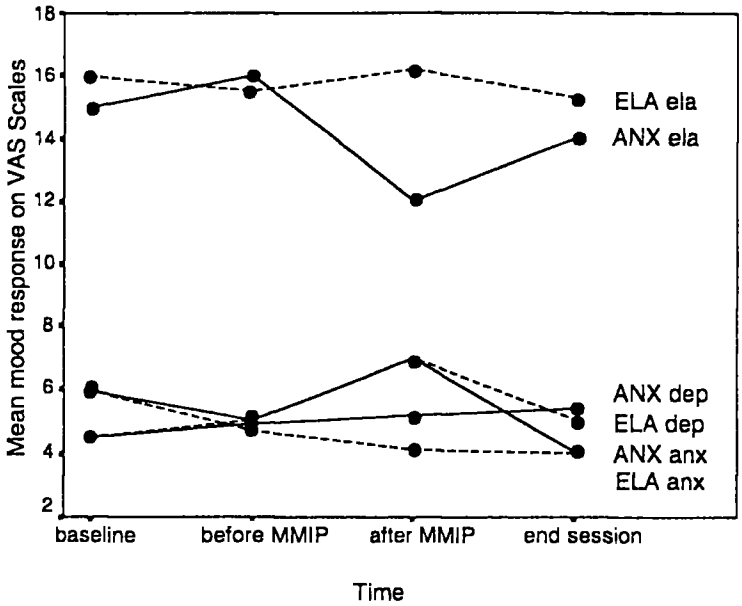

Figure 2.

Mean ratings of elation, depression, and anxiety for elation and anxiety MMIP in Albersnagel's (1988) experiment. Full line indicates anxiety induction, dotted line elation induction. Capital letters denote type of mood induction (ANX: anxiety or ELA: elation), lower case letters indicate measurement scale (ela: elation, dep: depression, and anx: anxiety). (adapted from Albersnagel, 1988)

psychophysiological measures, much needed data on the dynamics of mood response could be obtained.

In summary, substantial evidence suggests that the MMIP influences self-reported mood, but also that these ratings may be susceptible to demand characteristics. Even though considerable efforts have been made to rule out demand explanations, the results regarding self-reports are inconclusive. Other measures, less reactive to explicit demands, such as behavioral, cognitive, and physiological measures may help to shed further light on the effectiveness of the MMIP (Brenner, 2000).

Behavioral measures

A number of standardized behavioral measures have been found to be affected by the MMIP. In this section, evidence from different studies employing a variety of behavioral and cognitive measures sensitive to mood changes will be reviewed (Mayer and Brewer, 1985). Table 4 is a summary of findings from studies using behavioral measures. The table shows comparison of negative-positive (N-P), positive-neutral (P-Ne), and negative-neutral (N-Ne) inductions. The symbols (≠)

indicate significant difference (p .< 05) between groups, (=) no significant difference (p .> 05) between groups, and (-) comparison/analysis not included.

Table 4
Summary of selected MMIP studies using standardized behavioral mood-sensitive tasks.

		Results[a, b]		
Measure	Study	P-N	P-Ne	Ne-N
Writing speed	Clark (1983)	≠	=	≠
	Pignatiello *et al.* (1986)			
	between comparison	=	=	=
	within comparison	≠	=	≠
	Kenealy (1988)	≠	≠	=
	Parrott & Sabini (1990)	=	-	-
	Parrott (1991)	=	-	-
Count time	Clark & Teasdale (1985)	≠	-	-
	Wood *et al.* (1990)	≠	≠	=
	Lenton & Martin (1991)	=	=	=
	Clark *et al.* (2001)			
	Paced counting	=	-	-
	Fast counting	=	-	-
Incentives	Clark & Teasdale (1985)	≠	-	-
	Lenton & Martin (1991)	=	=	=
	Wood *et al.* (1990)	≠	=	≠
Distance approximation	Kenealy (1988)	≠	≠	=
Word association	Kenealy (1988)	≠	=	≠
Subjective Probability	Teasdale & Spencer (1984)	≠	=	=
Coding speed	Wood *et al.* (1990)	=	=	=
Decision time	Kenealy (1988)	≠	=	≠

[a] N-P denote negative-positive, P-Ne positive-neutral, and N-Ne negative-neutral induction comparison.

[b] The symbol (≠) indicate significant difference (p .<05) between group means: (=) No significant difference (p .>05) between group means; (-) comparison/analysis not included

• **Count times.** Clark (1983) argued that the time taken to count from 1 to 10 is a sensitive measure of changes in naturally occurring depressed mood. Clark and Teasdale (1985) recorded participants' countings and replayed through a polygraph to obtain a visual speech print from which duration of counting could be measured. They found that the negative induction was associated with longer count times than was positive induction. Similar results have been obtained in studies of vocal expression of emotions, where speech rate typically decreases in depression (Scherer, 1986). Woods *et al.* (1990) obtained results similar to those of Clark and Teasdale, but found in addition that the negative induction differed from a neutral induction (see Table 4). Clark *et al.* (2001) distinguished between paced and fast counting, but failed to find any between-group differences on either measure.

• **Writing speed.** A number of investigators have used a number-writing task in which participants are asked to write down numbers, in descending order from 100, and are given 1 minute to do so (Velten, 1968). Clark (1983) and Kenealy found that this measure discriminated between negative and positive moods, whereas other studies have failed to replicate this finding (Parrott, 1991; Parrott and Sabini, 1990). In his review, Clark (1983) noted that all of the studies that showed a significant effect with this measure used analyses that took into account individuals' pre-induction writing speed, while almost all the studies that failed to find an effect used analyses that did not take into account individuals' pre-induction scores. Clark further argued that participants vary considerably in their number-writing speed while in normal mood and, hence, it may be difficult to show a significant effect of induced mood on this measure unless pre-induction scores are covaried out. The study by Pignatiello *et al.* (1986) supports Clark's ideas. In their first experiment, Pignatiello et al. used only post induction scores as a between-groups variable and failed to find any reliable effect between negative and positive mood. However, in Experiment 2 when a pre measure was included and used as a covariate in the subsequent analysis, a significant effect between mood conditions was obtained.

• **Incentives ratings.** Clark (1983) has shown that incentives ratings are responsive to induced moods in that loss of incentive is a feature of negative affect. In an attempt to measure incentives, Clark and Teasdale (1985) asked participants, given the chance at the moment of rating, how much they would like to engage in each of eight positive activities: "Right now, how much would you like to: (1) sit at home in your favorite couch reading a book, (2) have coffee with old friends, (3) go out shopping, (4) go to a party, (5) take a long, hot bath, (6) listen to your favorite record with your best friends, (7) take some physical exercise for yourself, and (8) go for a meal with some new and interesting people. Clark and Teasdale found that participants receiving the negative MMIP gave lower incentive ratings than did participants receiving positive MMIP. Woods *et al.* (1990) replicated this negative-positive finding, but also found that the negative induction differed from the neutral induction.

• **Word association speed.** Velten (1968) found that participants given the negative induction took longer to produce single word associates to stimulus words than participants given the positive induction. Using the MMIP, Kenealy (1988) replicated this finding and found that this measure also discriminated negative, but not positive, from neutral mood.

• **Decision time.** Kenealy (1988) used Velten's (1968) decision time task. Kenealy found that participants receiving the negative induction took longer to decide which of two weights was the heavier (Clark, 1983).

• **Subjective probabilities.** Subjective probability estimates of future events have been shown to be responsive to induced moods, in than negative mood participants are more pessimistic than positive mood participants (Mayer and Bremer, 1985). Teasdale and Spencer (1984) investigated the effects of the MMIP on such estimates. Participants receiving the negative induction gave lower estimates of the probability of future successes and lower estimates of the number of past successes than participants in the positive induction. Similar results using the MMIP methodology have recently been obtained by Stöber (1997).

• **Distance approximation.** Velten (1968) used a procedure in which participants were asked to close their eyes and make an approximation of a specified distance by placing their hands those distances apart. Using this method, Kenealy (1988) found that participants receiving the negative MMIP estimated a significantly smaller distance than did participants receiving the positive MMIP.

• **Coding speed.** This procedure presents participants with a coding scheme in which the numbers correspond to certain symbols. The participant is asked to fill out 72 empty boxes using this coding scheme. Previous research has suggested that sad participants are slower than happy participants on this task, but Wood *et al.* (1990) failed to find any effect of the MMIP on this measure.

In sum, both psychomotor (*i.e.*, writing speed) and psychological (*i.e.*, incentives) mood-sensitive measures have been found to differentiate between negative, neutral, and positive mood induced by the MMIP. Apart from the more standardized mood measures reviewed above, a large number of other cognitive and behavioral measures have been the dependent variables in studies employing the MMIP. These studies also add to the existing evidence of the effectiveness of the MMIP. Below are some of these studies reviewed.

• **Additional behavioral measures.** A large number of studies have shown that the effects of music on mood may influence consumer behavior (for reviews see Bruner, 1990; Gardner, 1985; North and Hargreaves, 1997a). For instance, in a study of purchase intentions, Alpert and Alpert (1988) found that happy music made

participants happier, but sad music produced the highest purchase intentions. In a related study, Gorn *et al.* (2001) showed that arousal and pleasantness induced by music yielded different effects on evaluation of advertisements. Pleasantness colored the evaluation of the advertisement in a mood-congruent manner, whereas arousal polarized evaluations in the direction of the advertisement's affective tone. Similar effects on judgment were found by Bouhuys *et al.* (1995), who found that depressed participants perceived more sadness and less happiness in facial expressions than did elated participants. Such mood-congruent effects are well established in the literature on mood and judgment (for an overview see Schwarz and Strack, 1999).

Yet other studies have looked at the effect of MMIP on various behaviors. In a study of eating behavior, Heatherton *et al.* (1998), found that participants exposed to the negative MMIP increased eating as compared to controls. Willner *et al.* (1998) showed that replaying sad music to participants resulted in increased "chocolate craving". Adaman and Blaney (1995) induced elated, neutral, and depressed mood in participants using the MMIP. After demonstrating the effectiveness of the mood induction, they found that both elated and depressed participants scored significantly higher on creativity measures than did neutral participants.

The effectiveness of the MMIP has been demonstrated in various studies on mood-dependent or mood-congruent memory (Balch *et al.*, 1999; Bower, 1981; Parrott, 1991). For instance, Clark and Teasdale (1985) investigated the effects of the MMIP on the recall of positive and negative words. Participants in a negative mood recalled more negative words than positive words, while participants in a positive mood recalled more positive words than negative words. Similar results have been obtained for personal memories (Parrott and Sabini, 1990) and emotionally neutral stories (Västfjäll, 1997). Balch *et al.* (1999) have demonstrated that material learned in one mood (induced by music) is better recalled in the same mood than the opposite (see also Eich and Metcalfe, 1989).

A final example is Durand and Mapstone (1998), who studied challenging behavior among persons with severe mental retardation. Their procedure relied on recording behavior while participants were exposed to mood-inducing slow *vs.* fast tempo music. Durand and Mapstone coded both behavior and facially expressed emotions and found that challenging behavior (demands, commands, comments) were most evident in the slow tempo condition. Further, the coding of participants' facial expressions indicated that they reacted emotionally to the music.

In sum, a large number of measures other than self-report indicate that negative moods induced by music can be differentiated from positive ones. These measures are less reactive to demand characteristics than self-reports, and together these findings attest to the effectiveness of the MMIP. However, it appears that the role music plays for mood change is difficult to determine, and the effects documented above could have been obtained with other, non-musical MIPs.

Physiological measures

Unfortunately, only a few MMIP studies so far have used physiological measures to determine mood change. Pignatiello, Camp, Elder, and Rasar (1989) compared the MMIP with the Velten VIP by means of both self-report measures and physiological recordings. They measured heart rate, systolic and diastolic blood pressure, finger pulse amplitude, and respiration rate while participants listened to the positive, negative, or neutral music from Pignatiello *et al.* (1986) or read the corresponding Velten statements. They found that neither technique affected diastolic blood pressure or finger pulse amplitude. However, for both conditions positive mood was associated with increases in heart rate and systolic blood pressure. In addition, it was found that the MMIP resulted in bidirectional response trends for heart rate and systolic blood pressure (positive induction increased and negative decreased heart rate/blood pressure), whereas these findings were not obtained with the Velten technique. Pignatiello *et al.* found the physiological responses correlated well with musical tempo, where sad music had slower tempo, happy music faster. Subjective responses further supported this notion: participants in the positive induction reported that the music made them feel relaxed, yet excited with an increase in energy and spirit. Participants in the negative condition also reported the music as being sedating, relaxing, and soothing. Still, self-reports on the DACL suggested that participants in the positive and negative conditions indeed felt happy and sad, respectively. The physiological responses were also correlated with self-reports: the MMIP resulted in a significant correlation of -.48 between DACL scores and heart rate. Similar results were obtained for systolic blood pressure and the DACL ratings ($r = -.45$).

Clark *et al.* (2001) measured salivary cortisol levels, a measure of stress, for participants exposed to either negative or positive MMIP. Even though a general salivary cortisol profile was obtained during the course of the experimental session, no significant differences were obtained between mood conditions, even though self-reports suggested that different moods were induced. Clark *et al.* thus conclude "this study does not support salivary cortisol measurements as a simple and reliable objective method of validating psychological mood induction." (p. 185). However, using a repeated measure design spanning over a 6-week period where participants were exposed to an combination of guided imagery and music, McKinney *et al.* (1997) found that cortisol and self-reported negative moods decreased. (For further discussion of physiological measures of responses to music, see Gabrielsson, this issue.)

Factors influencing the MMIP

Apart from the music itself, a number of factors may modulate emotional reactions. First of all, participants' initial mood may affect how they respond to the music. In fact, there are some studies showing that choice of music listening may in part be determined by mood (*e.g.*, Stratton and Zalanowski, 1997). Sloboda and O'Neill (2001) and Sloboda (1992) review research showing that participants may use music

to repair an unwanted mood or to maintain a wanted mood. Research outside music psychology has also acknowledged that music may serve as an efficient extrinsic means of affect regulation (Morris and Reilly, 1987). In terms of direct mood effects, Wheeler (1985) has reported that mood and musical preferences interact: a sad mood was improved by liked (but not necessarily happy) music, and happy moods were worsened by disliked music. However, most research using the MMIP controls for initial mood (pre-induction score), why this should be a small problem. Some studies also control for trait depression, using Beck's Depression Index (BDI). Usually these studies omit participants scoring high on this test, since they may react differently than non-depressed participants.

Other measures of individual differences, such as affect intensity, may be worth including in MMIP studies. Affect intensity is a measure of a stable individual difference characteristic: it measures to what extent the individual experiences both strong negative and positive emotions (Larsen and Diener, 1987). Larsen and Diener proposed that individuals are either over- or underaroused at baseline and seek to obtain an optimal level of arousal. As a consequence, underaroused individuals will seek stimulation whereas overaroused individuals will avoid stimulation (*cf.* Berlyne, 1971; see North and Hargreaves, 1997b, for an overview). Individuals who are high in affect intensity are therefore expected to be more reactive to emotional events such as a mood induction with music.

Other personality measures such as neuroticism and introversion-extroversion (Eysenck and Eysenck, 1968) may also be predictors of susceptibility to the MMIP. Teresiz (1993) found that neuroticism predicted susceptibility to a negative MMIP. However, this was only found for women. The MIP literature is ambiguous as to whether there are any gender differences in responding to the MMIP. Albersnagel (1988) and Rogowski (1991) found that women were more susceptible to the effects of the MMIP, but other studies (*e.g.*, Clark and Teasdale, 1985; Pignatiello *et al.*, 1986) have failed to find this association.

Not only cognitive and personality factors may influence the effectiveness of an MMIP. Environmental factors, such as listening environment and playback techniques, may also play a role. The MMIP studies reviewed so far have differed as to whether the MIP has been administered individually or in groups. There is some recent evidence showing that MIPs generally are more effective when participants are tested individually (Bates, Thompson and Flanagan, 1999), why MMIP administered in groups should be avoided. Västfjäll (2002) also argued that acoustical factors might be of importance for the intensity of response to the MMIP. In a between-groups design, the same musical piece was replayed in mono, stereo, or using a six loudspeaker set-up. The idea was that a more advanced playback would immerse the listener more than simple mono playback, and thus intensify the mood response. Using self-reports, it was shown that participants in the stereo and six loudspeaker set-up responded more strongly than did participants in the mono condition. It was further found that

the mood response was mediated by ratings of playback quality and feelings of immersion in the sound.

Conclusions

This article has reviewed research showing that music is an effective method for the induction of moods. Even though the MMIP is associated with problems, such as demand characteristics, evidence from self-reported mood, standardized mood sensitive measures, cognitive variables, and physiological measures indicate that the MMIP can induce positive, negative, and neutral moods. It is difficult, however, to assess the role of music in this. It has indeed been shown that a "subtle" MMIP (without instructions on how to change the mood) is effective in inducing the desired moods, but still cognitive processes (*e.g.*, thinking about past events) enter into the procedure. But maybe cognitive priming is not such a severe threat to the MMIP, since this may resemble how people actually listen to and react to music. It seems unlikely that a direct, non-cognitive response is the only type of emotional reaction to music that people experience. An interplay between cognitive and affective processes seems to be an equally likely response. Sloboda and O'Neill (2001) reviewed research showing that everyday emotional reactions to music are linked to everyday activities. Furthermore, a main cognitive process covarying with emotional reactions was that the music reminded people of valued past events (Sloboda, O'Neill and Ivaldi, 2001).

The fact that there are individual differences and differential responding to music poses a problem to MMIP studies that require an efficient method of inducing mood. This is however an established fact in music research that even may help us understand when and why listeners experience emotions or moods in relation to music (Sloboda and O'Neill, 2001). Scherer and Zentner (2001) outlined a set of "production rules" to help understand emotional responses to music. In agreement with many MMIP studies and research on music and emotion, they note that structural and performance features may be primary determinants of emotional responses. However, in addition, they consider listener features such as musical experience, traits, and current states, as well as contextual features such as location and event (see also Gabrielsson, this issue). This view agrees well with findings that a number of factors influence individual susceptibility to MMIP. Even though some of these factors are controlled for in the standard MMIP (*e.g.*, initial mood), the use of this model for further improvement of the MMIP seems to be a promising venue for future research.

As noted by Scherer and Zentner (2001) and Gabrielsson (this issue) emotion induction ("I feel sad") and perception ("the music sounds sad") need to be distinguished in experiments on emotional responses to music. Most MMIP studies have used clearly self-referent mood adjective checklists ("I feel blue, depressed" etc), but in some cases it cannot be ruled out that participants are in part reporting

the affective tone of the mood-inducing music rather than their own response. Thus, MMIP studies using self-reports need to make this distinction clear to participants.

Several other findings from research on emotion perception and induction may help improve the MMIP. Future research could use the methodology of having the same musical piece played with different emotional expressions (*cf.* Juslin, 2001; see also Juslin *et al.*, this issue) and study the effects on mood. Because a number of studies have been able to link musical components to reported mood (*e.g.*, Balch *et al.*, 1999, Pignatiello *et al.*, 1989), it is plausible that this methodology may help us understand the link between expressed and experienced emotions. It is likely, however, that musical characteristics play a larger role for emotion perception than for emotion induction (Gabrielsson, this issue).

Related to this is the distinction between (experienced) mood and emotion. Most MMIP theorists have argued that music only can induce positive *vs.* negative moods (Clark, 1983). Other studies have attempted to select music to induce moods of the same valence (anxiety *vs.* depression) but failed to do so (*e.g.*, Albersnagel, 1988). In contrast, studies on emotional expression have shown that listeners can recognize and correctly identify a number of specific emotions (Juslin, 2001). In experimental research using the MMIP, it seems to be a matter of definition determined by the aim of the specific research whether it is emotion or mood that is selected as the term to describe the induced state (Siemer, 2001). For instance, Niedenthal, Halberstedt and Setterlund (1997) used the MMIP to specifically induce the emotion sadness as opposed to other negative emotions. Interestingly, they used the same musical pieces that Eich and Metcalfe (1989) used to induce more diffuse negative (and positive) moods. Thus, if it is mood or emotion that the music induces is determined by the empirical context rather than any stringent criterion (Siemer, 2001). Scherer and Zentner (2001) tried to distinguish between a number of affective phenomena related to music, among those the distinction between mood and emotion. As noted in the introduction, a mood state is often seen as a general, low intensity subjective feeling state which has no concrete object, and a relatively long duration. An emotion, on the other hand, is more intense, short-lived, and has an event or object that is appraised as eliciting the subjective feeling state. The present article has reviewed evidence showing that music produces mood effects with accompanying effects on behavior and cognitive processes. Following the definition above, mood and emotion may have different effects and determinants. Scherer and Zentner (2001) therefore urge that valid mood criteria should be used in determining the type of affective phenomena. They suggest that instructions could be improved by specifying that moods concern long-term, non object-elicited feeling states. Also behavioral measures employed should not be directly related to the preceding stimulus (music). Given this definition, it appears that several of the MMIP studies reviewed in this article concerned moods rather than emotions. Most of the behavioral and cognitive measures used in those studies

meet the mood criterions suggested by Scherer and Zentner. However, future research needs to demonstrate the differential effects of induced emotion and mood on self-reports, behavioral, and physiological measures.

Scherer and Zentner also noted that contemporary research on music and emotion may have to go beyond "everyday emotions" (*e.g.*, sadness, anger, fear) and study other emotions that are not necessarily associated with action tendencies and easily assessable verbal labels. In doing so, the research reviewed here may prove helpful. For instance, the many measures of self-reports, behavioral, cognitive, and physiological measures may provide researchers interested in the effect of music on emotion with new dependent measures. As Scherer and Zentner also notes, future studies need to use multiple measures from different measurement modalities within the same experiment. More research is needed to determine the role of music in the MMIP, but awaiting such results, researchers interested in the interplay between mood and other processes may use the MMIP as an efficient method to induce moods[1].

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• Emoción inducida a través de la música: una revisión del proceso del humor musical inducido

Este artículo revisa investigaciones que revelan que la música puede alterar el humor y las emociones de la gente. El también llamado "proceso de inducción del humor musical" (MMIP) confía en que la música produce cambios en los procesos de la experiencia afectiva. El hecho de que la música pueda tener efecto sobre la experiencia subjetiva ha sido utilizado para estudiar el efecto del humor sobre los procesos cognitivos y de comportamiento por un gran número de investigadores de la psicología social, clínica y de la personalidad. Este amplio campo de literatura, aunque poco conocido entre los psicólogos de la música, tiene muchas posibilidades de ayudarles a comprender la respuesta afectiva a la música. Con esto en mente, el presente trabajo ayuda a proporcionar una amplia revisión de la metodología empleada en un número de estudios que emplean el MMIP. La efectividad de la música como estímulo inductor del humor es discutida en términos de autovaloración, con índices psicológicos y de comportamiento. La discusión se centra en cómo los descubrimientos localizados por la literatura sobre MMIP se pueden aplicar a las actuales investigaciones y debates sobre las complejas relaciones entre la música y las respuestas emocionales.

• Induzione di emozioni mediante la musica: una rassegna della procedura di induzione emotiva della musica

Il presente articolo passa in rassegna le ricerche volte a dimostrare che la musica può alterare gli stati d'animo e le emozioni delle persone. La cosiddetta "procedura di induzione emotiva della musica" ("musical mood induction procedure" o MMIP) si basa sulla musica per produrre cambiamenti nei processi affettivi esperiti. Il fatto che la musica possa avere tale influenza sull'esperienza soggettiva è stato utilizzato per studiare l'effetto dello stato d'animo sui processi cognitivi e sul comportamento da un gran numero di ricercatori di psicologia sociale, clinica e della personalità. La vasta letteratura sull'argomento, seppure ancora poco nota fra gli psicologi della musica, costituirà per loro un ulteriore ausilio per comprendere le risposte affettive alla musica. A tale scopo, il presente articolo mira a fornire un'ampia rassegna della metodologia alla base di numerosi studi condotti con il MMIP. L'efficacia della musica come stimolo di induzione emotiva viene discussa in termini di auto-descrizioni, indici fisiologici e comportamentali. La discussione s'incentra sul modo in cui le conclusioni tratte dalla letteratura sul MMIP possono estendersi alla ricerca e ai dibattiti attuali sulla complessa interazione fra musica e risposte emotive

• L'induction émotionnelle dérivée de la musique : revue critique de la procédure d'induction de l'humeur musicale

On se livre ici une revue critique des études montrant que la musique peut modifier l'humeur et les émotions chez l'individu. La procédure d'induction de l'humeur musicale (*musical mood induction procedure*, MMIP) s'appuie sur la musique pour induire des modifications des processus affectifs dans le vécu. Cette répercussion de la musique sur l'expérience subjective est abondamment utilisée dans l'étude de l'impact de l'humeur sur les processus cognitifs et sur le comportement en psychologie sociale, clinique et de la personnalité. Bien que peu connu des psychologues de la musique, ce vaste corpus de la littérature est susceptible de faciliter la compréhension des réponses affectives à la musique. Conscient de cette dimension, on cherche ici à fournir une critique approfondie de la méthodologie sous-tendant nombre d'études fondées sur la MMIP. L'efficacité de la musique en tant que stimulus inducteur d'humeur est étudiée en termes d'autosignalisation des indices physiologiques et comportementaux. La discussion se focalise sur les aspects de l'application des données issues de la littérature sur la MMIP à la recherche et au débat actuels sur l'interaction complexe entre musique et réponses émotionnelles.

• Gefühlsanregung durch Musik: eine Besprechung des Induktionsverfahrens musikalischer Stimmungen

Dieser Artikel bespricht Arbeiten, die zeigen, daß Musik Stimmungen und Emotionen verändern kann. Das sogenannte. „Musikalische Stimmungs-Induktions-Verfahren (MMIP) stützt sich auf Musik, um Änderungen in erlebten affektiven Prozessen hervorzurufen. Die Tatsache, daß Musik eine solche Wirkung auf das subjektive Erleben haben kann, wurde von vielen Forschern in klinischer, Sozial- und Persönlichkeitspsychologie herangezogen, um die Wirkung von Stimmungen auf kognitive Prozesse und auf das Verhalten zu studieren. Diese umfangreiche, unter Musikpsychologen wenig bekannte Literatur kann wahrscheinlich helfen, zu einem Verständnis affektiver Reaktionen auf Musik zu gelangen. Ziel dieses Beitrages ist es daher, die Methodologie, die hinter einer Anzahl von MMIP-Studien steht, ausführlich zu besprechen. Die Effektivität von Musik als stimmungsschaffender Reiz wird von Selbstbeobachtung, physiologischen und Verhaltensindizes her diskutiert. Hierbei konzentriert sich die Diskussion darauf, wie Ergebnisse aus der MMIP-Literatur für die laufende Forschung und Debatte zum komplexen Zusammenspiel von Musik und emotionalen Reaktionen nutzbar gemacht werden können.