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The Reflection of Psychiatric Semiology and Symptomatology on Musical Structure: A Case Study of a Patient Diagnosed with Obsessive Compulsive Disorder

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ABSTRACT

Several studies associate musical features with specific aspects of a patient's emotional states. Less work is carried out however in the association between musical discourse and structure and the patient's psychiatric signs and symptoms. This study aims to investigate the potential reflection of psychiatric semiology and symptomatology of a patient diagnosed with Obsessive Compulsive Disorder (OCD) onto her musical improvisation. We describe the case study of a 41 year old female patient diagnosed with OCD and also presenting other related psychotic symptoms. The patient had three interactive music sessions with the MIROR - Impro prototype system, a machine learning based system which interacts with the user on improvisations, responding by using and rephrasing his/her own musical material and thus creating a musical dialogue. Data collection involved two clinical interviews with the patient, access to her medical file, recording of musical sessions in order to analyse the musical improvisations and video recording to observe the patient's related behaviour. We compare findings from the music analysis of the improvisations, the corresponding behaviour and the clinical data we obtained and analysed, using an analytical music therapy reflection. Our results show that aspects of the patient's pathology can be associated with musical attributes and structures found in the improvisations. In particular, the patient's logorrhea observed in the interviews is translated into non-stop playing , impulsivity becomes intensive playing, the fast tempo reflects anxiety, repeated musical clusters reflect fixation on ideas, and other musical features are related to aspects of the patient's mood.

I. INTRODUCTION

The reflection of a composer's or performer's emotions onto his/her music has been studied by musicologists and music psychologists for many years. In the domain of psychoanalysis, although Freud himself was less interested in music compared to other arts, analysts started being interested in the relation between musical expression and psychopathology, mostly by analysing the psychopathology / psychobiography of great composers and its influence to their work. Max Graf (1906, 1911) was interested in Wagner, Eduard Hitschmann wrote on Schumann (1915) and Brahms (1937) while Richard and Edith Sterba (1955) worked on Beethoven. Other works have been carried out by important psychoanalysts such as Theodor Reik (1953), one of Freud's earliest students, who took up the theme of "haunting melody" in Freud's *Introductory Lectures on Psychoanalysis* (1915–1917) to demonstrate, by contrast to Freud, that musical structure can represent feelings. In Reik's view, melody can convey emotion far better than words. Reik argued that music is the voice of the "unknown itself", which may become compulsive in its attempt to convey a secret message. Reik speculated that the reason unconscious material sometimes emerges as a melody, rather than as mere thoughts, may be that melody better indicates moods and unknown feelings. This seems to be in agreement with Beethoven's words, when he describes where he gets his musical ideas, that «..they come without being demanded, immediately or gradually, what evokes them are the dispositions of the soul (Stimmungen) that express themselves by words to the poet and by music to me...» (Massin J. et B., 1960).

Music psychology has also studied the emotional power of music for many years. Some of the earlier attempts include Schoen and Gatewood (1927), who studied which kind of moods are likely to be aroused by listening to music. In this study, human subjects were asked to choose from a pre-selected list of mood terms to describe their feelings while listening to 589 music pieces. Among the presented moods, sadness, joy, rest, love, and longing were among the most frequently reported while disgust and irritation were the least frequent ones. Henver (1936) did the earliest and well-known systematic attempt at creating a categorisation of music and mood taxonomy to «qualify» music (see Figure 1).

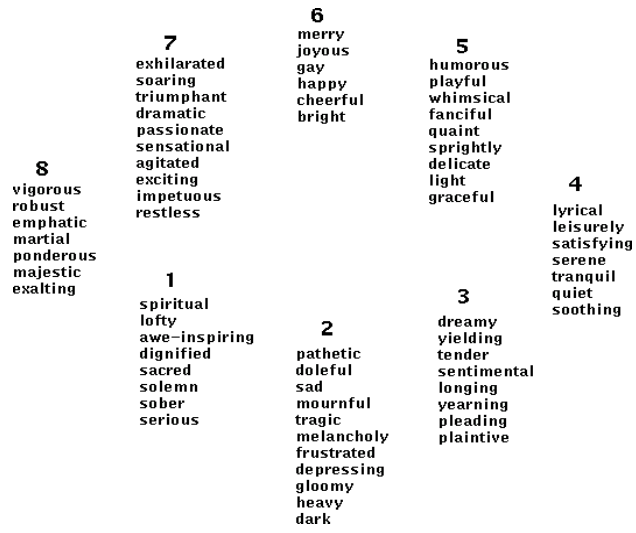

Figure 1: Henver's taxonomy of music and mood (1936).

Other well - recognised approaches include dimensional models to qualify music, where emotions are positioned in a continuous multidimensional space. Among these dimensional models, Russell's model (1980) on the combination of valence and arousal dimensions has also been adopted in more recent studies, which have been using similar taxonomies (for example Kim et al, 2008; Laurier et al, 2008; Lu et al, 2006).

Further studies have been carried out in the domain of isolated musical elements and their influence on emotion. Tonality (Revesz, 1946), harmony (Frances, 1972), tempo (Imberty, 1976), mode (Henver, 1936) and other isolated musical parameters have been studied for their influence to human emotion.

The influence of music on emotion also motivated related studies in neurology and psychiatry. Sachs (2008) describes a number of case studies of neurological patients suffering from significant brain damage situated in cerebral areas related to emotion (for example important damage of frontal lobes due to rupture of brain aneurysm, apathy due to encephalitis) but also certain psychiatric patients suffering from diagnoses traditionally linked to flat emotion (for example autism, psychopathy). He observes that these patients were remarkably connected to emotional states through music listening or practicing, and particularly through singing.

II. AIMS AND METHODS

Our data collection involved both clinical and musical data collection and analysis. Concerning the clinical data, we held one interview with the psychologist of the establishment who gave us information about the patient's clinical history and two clinical interviews with the patient, by the doctor - music therapist. We also recorded on camera the patient's behaviour.

The musical data collection involved three interactive music sessions with the MIROR - Improvisation prototype system, a machine learning based system which interacts with the user by using and rephrasing his/her own musical material and thus creating a musical dialogue. This system has been developed as part of the European Project MIROR (Musical Interaction Relying on Reflexion, see www.mirorproject.eu) . We carried out three sessions of approximately one hour each, based on free improvisation on the Miror – Impro System. Three different types of settings in the software of the MIROR -Impro were used, specifying the type of answer the system produced: Setting A (where the system provided an almost identical answer to the patient's melody) and setting B (where the system responded with a 'very different' musical answer, i.e. a distant variation of the user's input). The patient received no instructions or information on the settings, just the information that the piano can 'answer' to her.

We recorded all musical sessions with the system in order to analyse the musical improvisations and also recorded on camera to observe the patient's related behaviour. We compared the findings from the music analysis of the improvisations and the corresponding behaviour recorded by the camera with the clinical data that we obtained and analysed. The data analysis was done by interpretation of the musical features and characteristics in relation to clinical elements, as carried out in analytical music therapy proposed by music therapists such as Priestley (1994) and Lecourt (1993) described above. Psychoanalytical elements were completed by an association of musical features with psychiatric description of the patient's signs and symptoms.

III. CASE STUDY

A. Clinical History and Background

This subsection describes information taken from the initial interview with the psychologist of the psychiatric establishment where the patient was being hospitalized concerning her clinical history.

Fanie is a 41-year old woman hospitalised in a pension for chronic psychiatric patients with the diagnosis of Obsessive-Compulsive Disorder. She presents a somatic delirium, as well as obsessive ideas and compulsive behaviours concerning food, cigarette, tea and coffee consumption. She also presents signs of logorrhea, psychomotor excitation and impulsivity that lead her to behavioral disorders and socially non-acceptable actions. Living with her relatives as well as other patients is a challenging task that she has managed to accomplish the last few months, in the actual psychiatric establishment where she is being hospitalised. Fanie's difficulties began at the age of 14, when she presented an erotomanic delirium and socially unacceptable behaviour, that led her alcoholic and violent father to punish her by physical agression at the time. She was first hospitalised at the age of 16 and her medical file reports indications of acoustic hallucinations, which were never confirmed. At the time, a certain religious obsession which was also present in her delirium was noted. She spent the rest of her life living with her parents until their death in her native village, then with an aunt who also reported serious behavioural disorders and thus difficulty in cohabitation. She was finally admitted to a pension for psychiatric patients. She was treated for several years with antipsychotic treatment with poor results, until the psychiatrist changed the diagnosis to OCD and consequently her medical treatment to antidepressant medication, to which she responded much better. She has also been treated with cognitive psychotherapy. Role playing and skill learning has helped her to adapt to group life and improve her self-care skills. Her relation to her brother, the only member of her family now, is conflictual.

B. Session 1

1) Clinical Interview

During the interview with the doctor - music therapist, with the presence of the psychologist and our team, the clinical signs mentioned above were confirmed. We noticed impulsivity and compulsive repetition in certain phrases of Fanie's verbal speech as well as in general behaviour, obviously reflecting fixed ideas (i.e. the phrase 'I don't even want to see him' repeated several times, reflecting an obsessive idea about her brother). The emotional discharge expressed in speech and gesture involved intense feelings of anger towards her family; she felt that they abandoned her and that they were ashamed of her. She particularly expressed anger but also agressivity and fear towards her brother. An attention disorder was also noted, as it was very difficult to move Fanie's attention from a certain manipulation with her mobile phone to our work. She also confirmed her adaptation to the pension, by expressing verbally friendly feelings towards the establishment, personnel and other patients.

It is important to mention here a dream that the patient had the previous two nights before the session: She was with her dead mother, asking her if things would be ok, if she would get married and have children, and then she was dead

and going to Hell. The dream reflected an obvious anxiety and agony, as well as a fear of an upcoming punishment related to guilt.

2) Musical Behaviour

Passing from speech to music was not easy. But when the instrument was presented to her, her response to it was immediate and enthusiastic. The only instruction she received was that the piano could respond to her. The total duration of her improvisation was 11 minutes and 15 seconds and she played with three different settings.

- First setting : No response from the piano, the patient played alone (3 minutes). She started playing immediately with joy and enthusiasm. She played by using the whole hand, producing clusters, by a repetitive movement of the hand from the middle area to the outer ends of the piano and back. The movement was stereotyped, repeated throughout the whole session and gave a melodic movement resembling coming up and down a scale, with the difference that it was made by clusters and not by individual notes. Her playing had vivid regular pulse (tempo 140 bpm), without following a certain rhythmical pattern. Halfway through, she presented a small change by augmenting the intensity of her playing - she was playing loudly, and without pauses.
- Second setting «A : Same» : the piano responded by the «same» phrase, mirroring the musical phrase that she played (3 minutes and 49 seconds). The patient continued playing with the same cluster patterns, pulse and intensity without listening to the piano's answer. She often interrupted the piano's answer before its end to start again her repetitive cluster model, same as we described above. Nevertheless, when she listened to the mirroring of her phrase she was smiling. The tempo at some moments was very fast (210 bpm) and she presented several «explosions» of such increased tempo and intensity throughout her playing, that calmed down after a while. She played with such great tension and speed that at the end she was physically tired, sweating.
- Third setting «B : very different» : the piano responded with a completely different phrase «very different» (2 minutes and 14 seconds). She started playing more calmly, separating her fingers and playing individual notes, and then went back to her usual cluster pattern. The reaction of the patient to the piano's answer was the same as before. She seemed unable to listen to the piano's answer, or make any distinction between the settings.

3) Analysis – Interpretation

In this first session, musical behaviour resembles verbal behaviour – the patient presents the same logorrhea in speech as in music: she plays continuously, leaving no space to her interlocutor to answer. When we analyse her childhood/relation to her family, it seems like she has never been «heard», «recognised» in the past therefore she does not «recognise», «listen» to the other either. Lacan (1937) described this process of being recognised visually as the mirror stage in the development of a child. Anzieu (1976) described later the importance of a «sound mirror» that the mother reflects to her child, which enables the child to construct his/her Self based on the material that she reflects.

Her «autistic» way of speaking, concentrating on herself and leaving no space for the other, can be related to her «autistic» playing, as she was ignoring the piano answers.

However, she took narcissistic pleasure by listening to her «mirror answers», confirmed by a big smile when she listened to the same phrases repeated by the piano and by her verbalisations : «What do you think of my playing?».

No pauses, the need for constant presence of sound was observed. When we think of the dream that she expressed just before the music session, about dying and going to hell, we could possibly associate this avoidance of silence in music in this session with her fear of death, clearly expressed in her dream and translated in music by fear of silence and constant need for sound.

Stereotyped gestures and speech can be associated with the stereotyped gesture of hands when playing (from the middle to the outer ends of the piano and back), resulting to stereotyped and repetitive music.

Explosions of increased intensity and faster tempo in her playing could be linked to her impulsive behaviour.

C. Session 2

1) Clinical Interview

The second interview was shorter, as we already had most of the clinical information we needed from the previous one. In addition, the patient already knew us and already felt confident with our team.

This time again she spoke about her family. The feelings of persecution from her brother arose. The emotional agitation that she felt when talking about him was obvious, as she hit her wrist on the table when thinking about the possibility of seeing him again - impulsivity already noted above was again confirmed. The patient felt threatened and she thought that her brother would hurt her, if left alone with him. She then continued with memories from her parents, she spoke about the physical aggression that she suffered from her father, and then expressed tender feelings about her mother.

She also spoke about her compulsive consumption of coffee, cigarettes and then tea during the last 20 years, confirming thus the information that we already had from her medical file.

2) Musical Behaviour

After the first session where Fanie didn't leave any space to the piano to answer, the team decided to give her the instruction to try to do a dialogue with the piano, to encourage her to listen to the piano's answers. The total duration of this improvisation was 15 minutes and 30 seconds. She again played with three different settings.

- First setting: no response from the piano, she played alone (5 minutes and 30 seconds). She started playing softly, using her fingers to play isolated notes in the beginning and not only clusters (tempo bpm 80), using more dynamics than in the first session.

However, she used the same stereotyped movement as in the first session. She also seemed to be listening to herself more, as she started forming a kind of cluster melody that she repeated around a tonal center, corresponding to a cluster that she used as her base. She later went back to an «explosion» of cluster hammering as in the first session. She also used glissando, a completely new element in her improvisation.

- Second setting «B: very different»: the piano responded with a completely different variation (6 minutes and 30 seconds). We gave her the instruction to try to do a dialogue with the piano. She played initially «explosive» clusters intensely in tempo bpm 210, as described above. The piano responded also by clusters, but changed the regular pulse, by introducing irregular rhythmic patterns and pauses. She kept her repetitive cluster patterns with the same stereotyped movement mentioned above, and as the piano responded something different, she seemed not satisfied, responding by herself with more intense playing. At the end, she verbalised her disappointment, saying «It says different things than me... I would like it to respond the same». Indeed, the system was blocked by the continuous hammering and failed to answer or answered not by mirroring but by a completely different answer, as the setting chosen was setting «B: very different».
- Third setting «A: Same» : the piano responded by the same phrase, mirroring the musical phrase that she just played (3 minutes and 30 seconds). She received the instruction to play «more simple, shorter phrases» so that the piano could answer. When the piano answered with the «same» option, she seemed satisfied, she said «It is better...».

Concerning the dialogue with the piano, she left some space for answer in this session: she played extremely long phrases with loud clusters, followed by long pauses, waiting for the piano to answer. However, the feeling of not being understood, when the piano failed to answer with the «same» option, was expressed by disappointment and nervousness. On several occasions she interrupted the piano to start hammering even louder when it failed to respond in the same way.

3) Analysis – Interpretation

We observed a big difference in the communicative-relational aspect compared to the first session – the patient seemed more open, recognising the piano, listening to the team's instructions for dialogue. She made an effort to communicate. The fact that she already knew the team as well as the instrument from the previous session seemed to play a positive role, reducing her stress towards the unknown. She felt more confident with our team than the previous time.

This was reflected in the music as well: she started listening to herself thus forming a kind of cluster melody and nuancing her playing. Both the tempo and intensity of her playing were reduced for a short period.

She also started leaving some space to the piano to answer, a very important element for such psychotic patients, for whom deficient communication and autism is often a key symptom. In this session, the musical dialogue reflected her deficient communication: Fanie interacts with the piano playing far too long phrases and leaving too long pauses, interrupting the piano to play her next idea etc.

When her hammering clusters did not produce a similar response by the system in this session, she expressed her disappointment by saying «It is saying something else», asking for the «same» option to come back and reacting to this "non-understanding" with impulsive, violent musical movements. The mirror stage, as described by Lacan (1937), had possibly not been completed when she was a child. Just like in her family, she was again feeling not heard, not understood and this caused feelings of guilt expressed by her verbalisation «my playing is not good...». As if it was her fault that the piano didn't listen or answered something completely different. This perception was different from reality, as musically speaking her playing was much more varied this time than the first time. Deficient contact with reality is again an important psychotic symptom.

D. Session 3

1) Clinical Interview

No clinical interview was held this time, Fanie started the music session directly, after a short dialogue with our team.

2) Musical behaviour

The total duration of the improvisation was 15 minutes. She played with two different settings.

- First setting «A: Same» : the piano responded by the «same» phrase, mirroring the musical phrase that she just played (4 minutes). She started playing clusters softly, then used separate fingers with the same stereotyped movement described above but the tempo now was slower (bpm 92). Suddenly, she started a cluster explosion with the usual intensity and tempo of bpm 210.
- Second setting «B: very different» : the piano responded with a completely different phrase (11 minutes). She used glissandi softly and then the usual cluster explosions, with the same stereotyped movement, then nuanced using her fingers. She made an effort to sing while playing, seemed disappointed and this feeling was accompanied by even more violent hammering. At the end, she asked our team to learn music notes, to be able to play musical pieces.

Fanie presents the same pattern of cluster playing as in the two previous sessions but continued nuancing, using the whole hand, then fingers only, then palms. The stereotyped movement was maintained; she was playing from the middle area towards the outer ends of the piano and then back. She seemed to listen to the piano answers; sometimes she gave it the possibility to answer by listening to the whole answer and other time she interrupted the piano's answer in the middle to play her own musical phrase. Her facial expressions revealed an effort to communicate.

However, she stopped the improvisation, criticising herself, saying that she did not play well, that it was not really music that she played and demanding to learn music, by "learning notes".

3) Analysis – Interpretation

The effort to communicate continued, her playing was nuanced and she listened more carefully to the answers of the piano, leaving space for an answer to occur.

However, disappointment and guilt from the previous sessions were still present, and finally she stopped playing in order to start criticising herself. Her demand to learn music was in essence a demand for frame, structure, learning and therapy and we welcomed it positively.

We observed though a «magical» way of thinking, as she said: «Is it not possible that it happens as I say? That I learn notes?», she asked. She seemed to believe that she will learn music just because she asked so.

In her improvised music, the will to communicate was observed by the space she left to the piano in this session compared to the first one but guilt and disappointment were also observed by the sudden stopping of her improvisation and the self-criticism that followed. It was an ambivalent movement.

IV. DISCUSSION

The comparison between the musical and clinical analysis reveals that various aspects of the patient's psychiatric semiology and symptomatology can be associated with musical attributes found in the improvisations.

The patient presented the sign of logorrhea in her speech, both as a general sign described by the psychiatrist and psychologist and as a sign observed clearly by our team, before the first clinical interview. Logorrhea is a sign typically present in manic disorders, but it can also accompany other pathologies. The patient's logorrhea is reflected in her music structure by non-stop playing, constant repetitions, no pauses, leaving no space to the piano to answer, especially during the first session. The patient's anxiety and fear was high during this first session, and she was also stressed about meeting a team that she didn't know and a new instrument, as all patients are before meeting a new therapist. Consequently, in this patient we can conclude that logorrhea, as a sign of her pathology, seems to be reflected in her improvised music structure by repetitive non-stop playing and may express an inner state of anxiety and fear.

The data collected by the psychologist and the patient's medical file as well as our team during the second clinical interview report impulsivity. This impulsivity can reflect an inner state of fear and stress of not being safe, and in her music this was expressed by the increased intensity of her playing as well as the sudden «cluster explosions». Indeed, she played loudly during all sessions, mostly the first one. Of course increased intensity can also reflect joy of meeting the instrument and having the chance to play. This element must be interpreted with caution, taking into consideration all other elements too. However, bursts of violent clusters arising suddenly, especially when she feels «not understood» by the piano, when it is answering something different to her, can be clearly related to impulsive behaviour as an answer to frustration.

In OCD patients, anxiety is a key symptom. Quite often, the patient may also feel afraid that something bad is going to happen, and may try to control and stop it by compulsive actions. These actions are the result of an obsessive thought that fixes on an idea and cannot move to another theme. The patient feels often obliged by an obsessive idea to perform compulsive actions that include often long and impressive rituals in order to calm the inner state of stress, fear and anxiety that he/she feels (Kaplan et al, 1994). In our opinion, the state of inner anxiety and fear is expressed in our patient's improvisations by both fast tempo and repeated clusters, that also indicate obsession.

Fast tempo is an ambivalent element, according to bibliography, as it can be interpreted both as expressing joy and life or passion and anxiety (Imberty, 1976). In our opinion, this fast tempo combined with repeated clusters played with stereotyped movements in a compulsive repetition and increased volume reflects anxiety.

Repetition is also an element often related to anxiety in music and can also reflect obsession: while regularity offers a stable and safe frame creating the feeling of safety and predictability, repetition on the contrary can reflect anxiety (Lecourt, 1984). In our opinion, the compulsive repetition of clusters by stereotyped movement is clearly related to obsessive ideas in this patient. She is obsessed, she cannot change the musical idea to something else by herself and that is why she asks for help in the third session: she wants to learn music, she wants someone to indicate to her what to play and help her get out of her fixed ideas, represented here by repeated clusters.

Poor content of ideas and stereotyped movement are often also seen in psychotic patients, especially in schizophrenia. Our patient clearly presents both poor content of musical ideas and stereotyped movement in the piano playing: she plays with the whole hand, in a symmetrical movement starting from the middle area of the piano towards the outer ends of the instrument and back in all three sessions, during most of the time.

Feeling confident and safe during the second session and after our verbal exchange resulted in less obsession in music, as she was able to nuance her playing : she used her fingers, modulated her intensity, listened to herself and created a kind of cluster melody.

Depressed feelings and guilt about «not playing well» (she felt responsible that the piano wouldn't answer to her in the previous session) were also reflected in the improvisation in the third session, by the sudden stopping of her playing.

V. CONCLUSIONS

Musical analysis compared to clinical analysis seems to confirm a reflexion of the psychiatric semiology and symptomatology as well as psychological inner states on to the musical discourse produced by the OCD patient.

Some musical attributes that link to general pathology characteristics appear in all three sessions (for example obsession, stereotypy, anxiety related to repeated clusters played intensely in a fast tempo), whereas others which relate to the emotional state of the day are reflected only in the

music of this day's session (for example feeling safe was reflected as a greater ability to nuance in the second session).

It is certainly difficult to interpret isolated musical features, as we need to have a complete picture of the musical discourse and sufficient clinical information to combine and interpret the related data. As in psychiatry, diagnosis is not a result of isolated items of the patient's speech or movement but the critical synthesis of all these elements in the doctor's mind.

However, it is clearly confirmed by this study that both signs and symptoms of the psychiatric pathology are reflected in the musical discourse of our OCD patient. This reflexion can be of valuable use for music therapy treatment but also for additional diagnostic information concerning the patient.

Further work with a bigger number of patients is required to confirm our findings and relate isolated musical features and overall musical structure statistically with specific psychiatric signs and symptoms.

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