

Developing the Keele Assessment of Auditory Style (KAAS): A factor-analytic study of cognitive trait predisposition for audition

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• ABSTRACT

The current study explored the existence of an auditive-specific orientation among everyday ordinary individuals from the general public and professional orchestra musicians (N=256). A personality-based cognitive trait grounded on predisposition or sensory preference for audition is referred to as an Auditory Style. The study developed and refined the Keele Assessment of Auditory Style (KAAS), and examined the underlying dimensions through factor analysis. The study found Auditory Style to be normally distributed, and while not rooted on the development of musical ability, professional orchestra musicians clearly demonstrated significantly higher scores than individuals from the general public. The underlying four dimensions of Auditory Style were interpreted as: Awareness, Responsiveness, Sensitivity, and Preference. Post-hoc analysis exhibited distinct factorial solutions for musicians and the general public, pointing to the possibility that characteristic stylistic profiles of each subgroup exist. Finally, the study showed that higher scoring professional orchestra musicians reported a discrete set of characteristic behaviors and attitudes.

INTRODUCTION

Personality and cognition have been for the most part separate disciplines. Each evolved from a different theoretical framework, research perspective, and methodological agenda (Endler, 2000). Yet, cognitive approaches to personality highlight the importance of cognitive thought in all aspects of human behavior. We use cognitive processes to portray events, discriminate the future, decide on a course of action, and communicate with others. While a cognitive bias to the study might focus on perceptual and intellectual functioning, an emphasis on individual differences would suggest that people are fundamentally typical in the way in which they solve representational problems of daily living. Endler points out that several personality theories which incorporate cognition, reconceptualize traits as "cognitive prototypes" and emphasize structures and inference processes. But, clearly another

of these was Charcot's belief that people could be distinguished by their cognitive sensory preferences, which he labeled: "visuels," "moteurs," and "audirifs" (Freud, 1901). Throughout the 1960s-1970s the concept of individual differences variegated by auditory life found its place within psychoanalytic texts. For example, Noy (1968) proposed that a cognitive style based on the auditory channel originates from aural activities during the preverbal infantile stage. Accordingly, during development this channel supplies a continuous source of input to the psychic structure, and that even in adulthood "this channel may continue to play a prominent role in emotional exchange with the outside world" (p. 344). Noy defined "Auditory Style" as "a specific sensory sensitivity [...] determined by a constitutional factor [...] permanently subjected to environmental influences" (p. 345). Another psychoanalyst, Nass (1971) argued that early hearing experiences (usually during infancy and associated to maternal bonding) served to develop a sensory style in certain children referred to as an "auditory style". Accordingly, this style is used as a means of adapting to and mastering reality among those children who use the auditory apparatus as their primary sensory mode. Nass hypothesized that a person whose primary sensory mode led to an overall "auditory orientation" would perceive interactions in the environment slightly different than those who are exclusively visual. During maturation such individuals develop a dependence upon auditory cues for the constant maintenance of the structure (Nass, 1975).

While psychoanalytic literature may have been intuitive and interpretive, few of its proponents took further steps to empirically validate their claims. This may explain some skepticism to psychoanalytic underpinnings of Auditory Style. Nevertheless, during the 1990s evidence from quite a different body of literature appears to rekindle the conception of Auditory Style. This empirically-based literature highlights "human predisposition for audition".

HUMAN PREDISPOSITION FOR AUDITION

By implication, the words "predisposition" and "constitution" refer to the likelihood that genetic factors order cortical structures in such a way as to predispose individuals more acutely to auditory stimuli. Today, science views human fetal existence to be more or less based on hearing. A predominantly aural animal, the infant exhibits an immediate ability to identify maternal voice. This not only indicates that newborns enter the world with specific perceptual acoustic experience from previous intrauterine life, but that the function of hearing is prior to seeing. Chamberlain (1993) points out that once we believed that fetal brain structures were so poorly developed that infants could not have possibly learned or remembered anything from the womb environment. But, the 1990s gave rise to a host of *intra-utero* research methods and infant perception/cognition research techniques which supported much evidence for fetal competence related to aural stimuli (Fassbender, 1993a; 1993b; 1996; Gellrich, 1993; Hepper, 1991a; Hepper and Shahidullah, 1992; Lecanuer, 1993; 1996; Mélen, 1994).

theoretical outlook is to focus on inclinations, dispositions, and the nature of individuals as represented by their cognitive styles. Cognitive Styles are thought to represent people's characteristic and typically preferred modes of perceptual and intellectual activity (Sternberg and Grigorenko, 1997), and can be defined as consistent individual differences in the way people experience, organize, and process information (Marinsen and Kaufmann, 1999). While cognitive abilities underline the amount and efficacy of information processing, Cognitive Styles emphasize the type and mode of information processed. Most certainly, Cognitive Styles are a function of a person's interaction with the environment, and some tasks are more optimally performed with particular styles. Sternberg and Grigorenko state that as children we are socialized into a value system which compensates some styles more than others, and these rewards may lead to operational preferences. But, "the fact that some people retain less rewarded styles despite environmental pressures suggests that socialization does not fully account for the origins of styles and that there may be preprogrammed dispositions..." (p. 708).

In the mid 1980s a group of Soviet researchers proposed there to be an association between auditory imagery and the developing personality structure (Kaufman, 1986). The Russian studies further postulated the existence of associations between auditory imagery and intrapsychic-cognitive activity, and demonstrated that such mental activity was not exclusive to music-related contexts but involved several spheres of the human experience. Yet, personality-based cognitive traits regulated through an orientation of sensory preference for audition did not generate much interest, nor did such theories receive more rigorous investigation. Akin to research on Cognitive Styles, this line of study seemed to have fallen out of fashion, especially among empirically based mainstream psychological research. Regarding the more general study of Cognitive Style, Sternberg and Grigorenko (1997) feel that eventual lack of interest had as much to do with discrepancies between internal and external validations, as it did with the fact that publishers were quick to package personality and typology-based inventories under the guise of standardized diagnostic measures (and this was more related to commercial profits than to applied psychometrics). However and unfortunately, the precept that auditory life could explain some of the variance of individual differences (on the grounds that adherence to an "auditory style" might promote distinctive and characteristic developmental outcomes) was simply politically unacceptable because it was originally entrenched in the subsequently rejected psychoanalytic culture.

PSYCHOANALYTIC INTUITIONS

In 1885 Sigmund Freud spent several months training with the well known neurologist Jean-Martin Charcot (1825-1893). In Paris, Freud became familiar with hypnosis, learned about hysteria (which Charcot himself had outlined), and was exposed to many assumptions which influenced his later theories and writings. One

The prenatal climate is one that is rich in auditory experiences. For example, newborns clearly exhibit auditory preferences for the human voice above mechanical and synthesized voices, and this suggests that prenatal auditory experiences may be an unparalleled contribution to postnatal speech perception (Babic, 1993; Standley and Madsen, 1990). From as early as a few hours after birth to only two days old, infants not only demonstrate the ability to discriminate between sound sources (such as the mother's voice versus other female voices, and human cries versus synthesized crying), but can also detect a story, TV theme jingle, or snippet of music that was repeatedly heard during pregnancy (Hepper, 1991b; Lecanuet, 1996; Wilkin, 1993). Human newborns are receptive to volume, pitch, harmonic spectrum, and the duration of sound; they demonstrate outstanding sensitivity to fundamental musical configurations and can distinguish between long and short events over a wide range of tempi, perceive pitch contour and streaming, and detect harmonic pitch intervals. By the mid 1990s, the main research-driven theories on prenatal auditory development underlined two overriding themes: (1) as a result of the wealth of acoustic learning that has taken place while *in utero*, humans command an auditory system that is greatly advanced already at birth; and (2) sounds heard before birth clearly influence specific postnatal human behaviors, such as the development of a general enhanced sensitivity to certain sound structures (Parncut, 1993). More than any other structurally organized acoustic stimulation, it appears that prenatal musical experiences contribute to shaping abilities and to developing long-term preferences or general sensitivity to sound (Lecanuet, 1996). In light of such findings, there seems to be much agreement among that humans are "predisposed for musicality" through prenatal acoustic experience.

However, the idea of human predisposition by fetal auditory experiences led H. Papoušek (1996) to two further issues: biological function, and the ontogeny of human communication, consciousness, and culture. One question he raised was: Does auditory predisposition serve in the developmental schema of maturation, both on an individual level and as a species (*i.e.*, evolutionary adaptation). That is, do the musical elements learned *in utero* not only serve to enhance postpartum identification of maternal voice, but lead to specific developmental milestones, and perhaps to a primary affect? Further, he questioned if the fact that infants are biologically predisposed for musicality points to some type of evolutionary requirement of the species. For example, does the preverbal communication and meaning of melodic contours as found in *Motherese* (maternal speech) play an important role in the environmental support to infant cognition, communication, and social integration? In a host of studies (H. Papoušek, 1993; M. Papoušek, 1993; 1996; Papoušek and Papoušek, 1982; Papoušek, Papoušek and Symmes, 1991) the Papoušeks demonstrated that during the bonding process parents control and optimize (to some extent) the infant's alertness and attention; that is, they intuitively utilize interventions involving proprioceptive, kinesthetic, tactile, and vestibular stimulation, coupled with auditory and visual modes. Accordingly, this

coevolutionary advantage embraces a predisposition for infant musicality which continues to play a role in later periods of preverbal interactions when a wide variety of musical stimuli are used — such as babbling, babytalk, lullabies, rhythmical auditory games, and songs. Nevertheless, while the processing of rather complex musical structures may be an innate biological predisposition of human infants, the Papoušeks questioned if such inclinations could "fade away" if as children they are not sufficiently engaged in auditory and musical interchanges. Especially in light of the fact that during the normal course of formal cognitive development children learn to pay increasing (and at times exclusive) attention to the sector of space they see, the *sensuscope* may become muted through impoverished auditory sensitivities and sterile musical interactions. This may explain why among many children innate biological predispositions for audition seem to follow a habitual diminutive course.

Most recently the concept of "musical identities" and the effects of music on the emerging self-identity have come to the surface. Macdonald, Hargreaves and Miell (2002) highlight how music is used as a means by which individuals formulate and express their individual identities. Accordingly, people use music not only to regulate everyday moods and behaviors, but to present themselves to others in a specific fashion. Musical tastes and preferences (which have been shown to be related to age, level of musical training, and aspects of cognitive style and personality) formulate statements of values and attitudes in expressing distinctive views of the world. Macdonald et al point out that while much research (such as Kemp, 1996) has delineated idiosyncratic development and typologies of music personalities, musical identities are highly related to similar traits and predispositions.

Taken together, the above sets of literature point to the possibility that some individuals engage in a personality-based cognitive trait and orientation grounded on innate predisposition or sensory preference for audition — referred to as an Auditory Style. The main aim of the current study, then, was to format a somewhat vague speculative developmental concept into specific behavioral and attitudinal outcomes that could point to such attributes and evaluate the distribution of these characteristics. The study attempts to explore characteristics of Auditory Style between groups of the general public who developed nonmusic-related skills and careers, in comparison to individuals who refined predispositions and sensitivities into musical skills and expertise leading to a music performance career. Finally, the study investigates within group variances among professional orchestra musicians themselves.

EARLY DEVELOPMENT OF KAAS: PILOT STUDIES

The Keele Assessment of Auditory Style (KAAS) was designed specifically to elicit retrospective information regarding developmental auditory life and orientation. The questionnaire survey was generated from a wide range of literature in an attempt to ensure that the items would represent an extensive scope of

demonstrated higher scores ($mn=126.90$, $sd=13.40$) than the non-musician general public group ($mn=109.90$, $sd=16.80$); this difference is statistically significant ($t=5.97$; $df=112$; $p<.001$). Moreover, to identify the underlying dimensions of Auditory Style, the Auditivity Scale was subjected to a factor analysis for extraction of principle components. Twelve independent factors were extracted by Principal Components Analysis (PCA) representing a total 68.5% of the variance, with a first factor accounting for 20.3% of the total variance. Pilot#2 also investigated the possible relationship between Auditory Style and State-Trait Anxiety (Brodsky, Sloboda and Waterman, 1994). The study replicated previously published reports that musicians score significantly higher trait anxiety than matched non-musicians, and demonstrated an interesting significant positive correlation between State and Trait anxiety with KAAS Total scores (while no such relationship surfaced for the non-musician controls). However, it should be pointed out that the findings of Pilot#2 offered limited resources with which to interpret the dimensional aspects of Auditory Style as far too many factors were extracted consisting of too few items. This then lead to one of the goals of the current study.

THE STUDY

The purpose of the current study is to evaluate auditive-specific behaviors and attitudinal dispositions among a heterogeneous sample comprised of everyday ordinary general public and professional orchestra musicians. The study strives to refine a conceptual understanding of Auditory Style by pursuing its underlying dimensions through the extraction of a more identifiable set of principle components. Utilizing such component dimensions as the connotational manifestations of Auditory Style, the study explores between-group characteristics of professional orchestra musicians versus individuals without formal music training, and investigates within-group variances among professional orchestras musicians.

METHOD

- Participants. The participants ($N=254$) in the study were British professional orchestra musicians ($n=156$; 61%) and fully employed individuals from the general public without formal music training ($n=98$; 39%). On average the participants were thirty-seven years old (musicians: $mn=36$, $sd=8.5$, $md=42$; general public: $mn=39$, $sd=11.4$, $md=44.5$), almost evenly split between the genders (129 males, 50.8%; 120 females, 47.2%), with final academic university degrees (65.7% matriculated at the undergraduate level; 14.6% completed graduate or post-graduate training). No meaningful differences were found between the professional orchestra musicians and non-musician general public regarding descriptive or demographic variables. The majority of the musicians (82.6%) were members of six contract orchestras in Northwest England, Ireland, or Greater London, while others (17.4%) performed regularly with one of seven freelance

characteristics intuitively proposed as indicators of Auditory Style. The items were chosen because their content linked auditive-specific behavior to one or more dimensions of human development, including: creative development, cognitive development, communication, emotional development, experiencing and expressing affect, imagination, inner-fantasy, interactions with others or the external environment, intimacy, intrapsychic sensitivity to sound, language acquisition, learning, memory, motivation, object relations, perception of self, self-esteem, self-image, and social development. Initially all items were collapsed into two broad categories: sound-related items of a general nature, and items about specific music involvement. Both parts were formatted developmentally, that is, grouped according to age-appropriate subsections. Responses were scored on a 5-point Likert Scale or by designating a "can't remember" response. Ten items were written in the negative gender, and hence required a reversed scoring.

KAAS was subjected to refinements three times prior to the current study (based on procedures and guidelines as outlined in Oppenheim, 1966). The initial 97-item set of questions was subjected to a Pre-Pilot Testing for comprehension of the items. As a result four questions were dropped from the set, and further improvements to the content and presentation format were made. The revised 93-item survey was employed in a first pilot study (hereafter Pilot#1). Undergraduate students ($N=92$) in two large British universities studying either music performance or general psychology completed the questionnaires; this level of participation reflected an overall 39% response rate. The declared purpose of Pilot#1 was to refine and validate the reliability of the survey through item analysis (frequency, facility, variance, discrimination, and test-retest reliability). As a result fifteen items were discarded, and the two-part format was dropped. KAAS was redesigned into a 78-item survey numbered in continuous ascending order. A more comprehensive second pilot study (hereafter Pilot#2) was undertaken with 114 individuals: 57 professional orchestra musicians and 57 everyday ordinary individuals without formal music training from the general public. Both groups were matched for age, gender, highest level of education, and employment status. The musicians were selected from a larger data pool in a stratified fashion controlling their source orchestra as a variable. The initial analysis of Pilot#2 data indicated that the majority of non-musician participants from the general public did not complete the final twenty-three items about specific music involvement. Therefore, to enhance between-group analysis and comparison, post-hoc refinements of the questionnaire were limited to the first fifty-five items which reflected a more general nature. From this set, nine items were deleted as they frequently presented missing data ($\geq 10\%$). Further, scale reliability analysis recommended the removal of another eight items. After these final adjustments were made, KAAS provided a stable and reliable "Auditivity Scale" (Cronbach's $\text{Alpha}=0.87$; Standardized Item $\text{Alpha}=0.87$). Auditivity Scale scores reflected a normal distribution ($mn=118.4$, $sd=17.3$, $md=119$, $\text{range}=63-168$). However, the professional orchestra musician group

orchestras in Northwest England¹. On the whole the musicians were from string sections (63.4%) or woodwind/brass sections (28.3%). The most predominantly played music instruments in the sample were the violin (25%), cello (13.4%), and viola (10.8%). The musicians were contacted through letters sent to orchestra halls, and then later respondents were re-approached via telephone. Individuals from the general public were full-time employees from sectors emphasizing business (21.4%), industry (20.4%), administration (15.3%), education (12.2%), medicine (10.2%), law (4.1%), and entertainment (3.1%). It should be noted that in an attempt to represent the widest possible sample, efforts were made to solicit individuals diversified by background, experience, training, final academic degree, and financial strata. This was achieved via a form of snowball sampling referred to as "chain-letter recruitment" whereby an initial few participants contacted in person by the researcher were first given questionnaires to complete, and then subsequently they themselves recruited additional participants from their neighborhood and workplace (handing each a questionnaire and self-addressed pre-paid return envelope). Unfortunately, two orchestras reported to have accidentally thrown out a set of questionnaires, and it is impossible to know how many questionnaires were distributed by the participants in their recruiting efforts. Therefore, while an exact response rate is difficult to assess, if the final sample of musicians (156/500) and general public (98/300) were tallied, then the most pessimistic estimate is an overall 32% response rate.

• **Materials.** The Keele Assessment of Auditory Style (KAAS) was designed and developed to elicit self-report retrospective information about developmental auditory life and orientation. It is self-administered in twenty-five minutes. In the current version, KAAS consists of 61-items scored on a 5-point Likert Scale rating responses from *never to always*, with an additional option ("0") to specify items that are *not relevant or can't remember*. Both sound-related items of a general nature (items 1-38) and about specific music involvement (items 39-61) are presented in three critical periods of development: "as a child/youngster" (ages 4-12); "as a teenager" (ages 13-18); and "as an adult" (ages >18). The first thirty-eight items were demonstrated in Pitor#2 (Brodsky *et al.*, 1994) to be a stable and reliable subscale — referred to as the Auditivity Scale.

(1) The musicians were members of the BBC Philharmonic Orchestra, The Halle Orchestra, the Royal Liverpool Philharmonic Orchestra (RLPO), the English Northern Philharmonia (Opera North in Leeds), the Royal Philharmonic Orchestra (RPO), the orchestra of the English National Opera (ENO), the Ulster Orchestra in Belfast, the Camarata in Manchester, the Manchester Mozart Orchestra, the Northern Chamber Orchestra, the Philharmonic Concert Orchestra, the Performing Arts Symphony Orchestra, the Music Department of Huddersfield University, and the Royal Northern College of Music in Manchester.

• **Data Analysis.** Among the goals of the current study is to identify the underlying dimensions of Auditory Style through an in-depth factorial analysis of the Auditivity Scale. First, two preliminary tests were used to indicate or rule-out the suitability of the factorization process: The Bartlett Test of Sphericity, and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy. Then, two phases of factorization proceeded: extraction and rotation. Principle Components Analysis (PCA) again extracted a rather large set of factors each consisting of only a few items, and hence two additional procedures as described by Rust and Golombok (1989) and West (1991) were utilized: Eigenvalues and Scree Plots. These later two maneuvers provided a clearer factorial design employing a reduced number of factors which adequately described the data. Finally, a Varimax Rotation for orthogonal uncorrelated factorial data was used to present a simple more interpretable structure of Auditory Style.

RESULTS

• **General findings.** Auditory Style (represented by the 38-item Auditivity Scale) was found to be a widely distributed trait among the population at large. The item mean scores were spread over a wide range (1.66-4.42), with an average item mean score of 3.08 (sd=0.47). The scale scores ranged between 63-168, with a mean score of 117 (sd=17.89). Subsequently Auditivity Scale scores were analyzed by subgroup in an effort to explore differences between professional orchestra musicians and everyday ordinary individuals without formal music training. While the professional orchestra musicians clearly occupied the upper portion of the score distribution (66-168), and the general public occupied the lower portion of the score distribution (63-144), a large overlapping area of scores (66-144) was seen. It should be pointed out that this large overlap which is common to both subgroups, is prudent evidence that Auditory Style is not exclusive to musicians nor is it necessarily based on the development of expert musical skills. However, the musicians clearly demonstrated a higher mean score (mn=122, sd=17.75) in comparison to the general public (mn=110, sd=15.90); this difference is statistically significant ($t=5.14$, $df=252$, $p < .0001$).

• **Factor analysis.** Focusing on factor analysis and the interpretation of underlying dimensions, the Bartlett Test of Sphericity indicated that the general sample reflected a multivariate normal population (Bartlett=3061.64, significance=.00000), while the Kaiser-Meyer-Olkin Measure of Sampling Adequacy demonstrated that the items were suitable for factorial analysis (KMO=.83). Initially, PCA extracted eleven independent factors which represented 60.9% of the variance, with a first factor that accounted for 20.4% of the total variance; all thirty-eight items loaded onto one of the 11 factors (≥ 0.4 level). However, Eigenvalues (Kaiser's criterion of eigenvalues = 1), and Scree Plot analyses (Cattell's scree technique for identifying factors) indicated that a four-factor design was a more suitable model to accurately

Table 2
Underlying dimensions of Auditory Style: Awareness (Factor 1)

#	Loading	Age*	Item
1.	.7186	C	I was aware that I felt and heard things in music that I could not articulate verbally
2.	.7098	T	I identified myself as having a special gift for music.
3.	.6610	C	I felt as if I could experience my emotions far better through music than through speech.
4.	.6555	C	I felt drawn to repeat and re-experience musical events that affected me.
5.	.6091	A	I feel as if there is a piece of music going through my mind.
6.	.6070	T	I imagined music in my mind when bored.
7.	.5243	T	When listening to piece of music I imagined that I too was among the performers.
8.	.5156	A	When I listen to music I experience and perceive a kinesthetic body "feeling" the music in addition to my ear "hearing" the music.
9.	.4964	C	The role models I most wanted to be like were music performers.
10.	.4816	T	I felt more comfortable within other social groups than musical social settings such as ensemble and choir. (R)**
11.	.4665	A	When improvising or humming to myself, I can decide whether I composed an original piece (phrase) or simply repeated one that I had heard previously.
12.	.4565	A	When I find myself in new surroundings I am first aware of the landscape before the soundscape. (R)**
13.	.4560	A	I am aware of an emotion depicted on the television/movie screen via the soundtrack before the screenplay action is revealed.

* AGE = C: "As a child/youngster"; T: "As a teenager"; A: "As an adult".
** (R) = Reverse Scoring or Negative Tense.

how long they had been actively exhibiting this behavior, nor from where the leitmotifs had stemmed. Moreover, their internal sense of security was associated to auditory stimuli, enabling them to experience comfort and solace through familiar melodies and rhythmic sensations.

Factor 3: SENSITIVITY. This dimension reflects an acute sensitivity to the affective parameters of voice and soundscape. See Table 4, next page. Soundscape is the aspect of the external environment that we hear, and is similar in nature to the related visually-based landscape. Individuals who demonstrated higher scores reported that as adults they are intensely attentive to the qualities and patterns of other people's voices far more than to the content itself. These individuals attribute their trust in others, as well as attraction and affections, to voice tone. Moreover, they reported emotional attachment to the vocal imprinting of their passionate others. That is, the auditory reference such as hearing the voice of a loved one is far greater in offering

describe the data set, and this model consisted of thirty-three out of the original thirty-eight items. The four factors represented 37.9% of the variance, with a first factor that accounted for 20.4% of the total variance. The underlying dimensions of Auditory Style, as represented by each individual factor, were interpreted as follows: (1) AWARENESS of auditive-specific identity and orientation throughout development; (2) RESPONSIVENESS to music as a child/youngster; (3) SENSITIVITY to the affective parameters of voice and soundscape currently as an adult; and (4) PREFERENCE for intoned textual settings as a child/youngster. See Table 1. The items of each component and their accompanying loadings are listed in Tables 2-5.

Table 1
Underlying dimensions of Auditory Style

#	Factor	Variance %	Component %	Accumulative %
1.	Awareness	20.4	53.8	53.8
2.	Responsiveness	7.1	18.7	72.5
3.	Sensitivity	6.0	15.9	88.4
4.	Preference	4.4	11.6	100.0
	TOTAL	37.9	100.0	100.0

Factor 1: AWARENESS. This dimension combines items from various life stages beginning with childhood throughout adulthood, and suggests an endearing orientation to music and sound as a psychological orientation and cognitive style. See Table 2. Individuals who demonstrated higher scores reported to have felt (*i.e.*, intuitively knew) that the non-verbal language aspect in music offered experiences which were far more intense than any other experience which involved verbal language. They were aware of, and recognized, that this orientation guided and organized their psychosocial development to some degree, especially regarding interpersonal relationships and intergroup membership during their teen years. Further, they understood that their admiration towards specific role models was ordained through some type of music affiliation. Finally, these individuals reported that they had been pre-occupied with internalized mental activity involving music (*i.e.*, musical imagery) from childhood throughout adulthood.

Factor 2: RESPONSIVENESS. This dimension reflects a specific responsiveness to music that one had had during the late childhood years. See Table 3 (p. 94). Individuals who demonstrated higher scores reported that as children/youngsters between the ages of five and twelve they were especially affected by music, as if it had taken control of them to a certain extent. They would suddenly find themselves making noises, humming, singing, moving, and beating rhythmically, not aware

Table 3
Underlying dimensions of Auditory Style: Responsiveness (Factor 2)

#	Loading	Age*	Item
14.	.6715	C	I found myself suddenly humming a piece of music or melody without realizing that I'd started.
15.	.6495	C	Music caused me to move in a rhythmic way (e.g. tap fingers, stamp feet, move head, sway body, etc.).
16.	.6454	C	I would hum bits and pieces of music while walking along the way not especially aware of their source.
17.	.6170	C	I discovered myself making noise (such as humming, singing, or beating) or moving rhythmically throughout the day.
18.	.5879	C	When I listened to music I found myself unable to sit still.
19.	.4778	C	I was comforted by a familiar tune or melody when sad.
20.	.4164	C	I found it both easy and enjoyable to fall asleep while on a train, bus, or motor car.

* AGE = C: "As a child/youngster"; T: "As a teenager"; A: "As an adult".

Table 4
Underlying dimensions of Auditory Style: Sensitivity (Factor 3)

#	Loading	Age*	Item
21.	.7669	A	Voice tone is a major influence on whether I am attracted to someone.
22.	.6805	A	I am very sensitive to the sound quality of other people's voices.
23.	.6281	A	I find I tend to trust people more if their voices are pleasing to me.
24.	.5918	A	When I choose names (e.g. children, pets, etc.) I pay attention to their rhythmic and musical sound.
25.	.4933	A	I have felt that when I am away from my significant other(s), the mere sound of their voice will relieve me from melancholy and loneliness.
26.	.4529	A	The external sound environment (soundscape) is a major factor for me when choosing neighborhoods where to live.
27.	.4083	A	I have felt that I must protect my hearing as it is my most important link to the outside world.
28.	.4073	A	During conversation I find myself listening or attending to the other person's speech patterns and vocal inflections more than the actual content itself.
29.	.4025	T	I was aware of the similarities and/or differences in intonation (tone qualities) between my voice and my parents' voices.
30.	.4003	C	I remember feeling afraid when I heard loud noises.

* AGE = C: "As a child/youngster"; T: "As a teenager"; A: "As an adult".

relief from loneliness and melancholy than looking at a picture. Further still, already as teenagers they were aware of voice tone as an inherited trait, sensitive to the apparent commonalities and differences between their individual voice and the vocal qualities of their parents. Finally, they noted that sound quality plays a major role in formulating life-time decisions, for example when considering the name of a child/pet or when choosing a house/neighborhood.

Factor 4: PREFERENCE. This dimension reflects a preference for intoned (i.e., tonal) settings as a child/youngster. See Table 5. Individuals who demonstrated higher scores reported to have enjoyed night time nursery rhymes, lullabies, and songs more than textual stories and book reading. Further, as youngsters they were aware that their comprehension of a text was significantly enhanced if heard aurally (i.e., read aloud).

Table 5
Underlying dimensions of Auditory Style: Preference (Factor 4)

#	Loading	Age*	Item
31.	.7062	C	I preferred stories and book reading at night time above lullabies and songs. (R)**
32.	.6662	C	I liked stories more than nursery rhymes and songs. (R)
33.	.4439	C	I found it easier to follow a written text if I or someone else read it aloud.

* AGE = C: "As a child/youngster"; T: "As a teenager"; A: "As an adult".
** (R) = Reverse Order or Negative Tense.

In an attempt to explore the association between the broad conception of Auditory Style and the individual four underlying dimensions, Auditory Scale scores were entered into an analysis of correlation with each of the component factors. The findings suggested statistically significant positive associations of the Auditory Scale with each of the extracted factors: Awareness ($r = .64, p < .001$); Responsiveness ($r = .47, p < .001$); Sensitivity ($r = .53, p < .001$); and Preference ($r = .28, p < .001$).

Finally, post-hoc analysis was undertaken to explore distinct variants of Auditory Style that might have resulted from group specificity. That is, factorial solutions were sought for homogeneous subgroups consisting of professional orchestra musicians versus the everyday ordinary individuals from the general public. The 4-factor Omnibus solution for the total combined heterogeneous sample is illustrated on the left-side of Figure A. It should be noted that each dimension component is allocated a unique shape (Awareness = Circle, Responsiveness = Square, Sensitivity = Triangle, and Preference = Hexagon), and that each item is assigned a number (1-

Table 6
Additional items loading on homogeneous factors

#	Age*	Item
<i>Professional orchestra musicians:</i>		
34.	A	I have noticed that I depend often on my sense of hearing for gaining information regarding where things might be (location).
<i>General public:</i>		
35.	A	I find silences in conversation more difficult to tolerate than actual differences of opinion.
36.	A	I become anxious when I become aware of a soundless environment (total quiet)

* ACE = C: "As a child/youngster"; T: "As a teenager"; A: "As an adult".

• Specific music involvement (with-in group analysis). The final goal of the current study is to explore individual differences among professional orchestra musicians. This planned post-hoc exploration looks at the development of a personality-based cognitive trait and orientation grounded on innate predisposition or sensory preferences for audition, throughout childhood, adolescence, and adulthood while refining expert musical skills. Strictly for comparative reasons, and not assuming to represent psychometric psychological entities, the musicians were classed as belonging to either the lower half (< 50%) or higher half (> 50%) of the sample by employing a median split of Auditivity Scale scores (md = 117; range = 66-168). Using this affiliation as a grouping variable, the additional set of 23 items relating to specific experiences involving musical activity was analyzed. See Table 7. It is important to point out that no significant differences were found between the < 50% musicians and the > 50% musicians regarding their general nature, including descriptive data relating to age, gender, highest level of attained education, orchestra membership, or orchestra section assignment. In addition, no significant differences were observed between these two subgroups regarding the average number of private students seen each week, their weekly schedules involving practicing and rehearsing, or the amount of performance engagements with large orchestras, small ensembles, or solo concerts per month. Nonetheless, the results indicated that the musicians with higher Auditivity Scale scores (*i.e.*, the sound-related items of a general nature represented by items 1-38) also scored higher on 22:23 items about specific music involvement (*i.e.*, items 39-61). After a Bonferroni correction ($.05/23 = .00217$), 7 of these items indicated a tendency towards levels of significance (between $p < .05$ and $p < .01$) while 6 items surfaced as statistically significant at the new level of significance ($p < .002$).

Musicians demonstrating higher Auditivity Scale scores (> 50% musicians) reported that as children involved in musical activity, they significantly more often had a "feeling of comfort" while producing certain sounds ($t = 3.64, 154, p < .001$).

38) as found in Tables 2-5. In Figure A the items appear vertically reflecting their contribution to the total variance with the highest loading item presented first (*i.e.*, at the top). The subsequent results of individual factorial analyses for each subsample group in the study indicated a 2-factor solution for the professional orchestra musicians, while a 3-factor solution was indicated for individuals without formal music training from the general public. These have been placed side by side on the right side of Figure A. Clearly, neither of these factorial solutions is inherently "good" or "bad", but rather each of the styles reflect characteristic components that accommodate these particular individuals with respect to their adaptiveness in specific situations as viewed in retrospect.

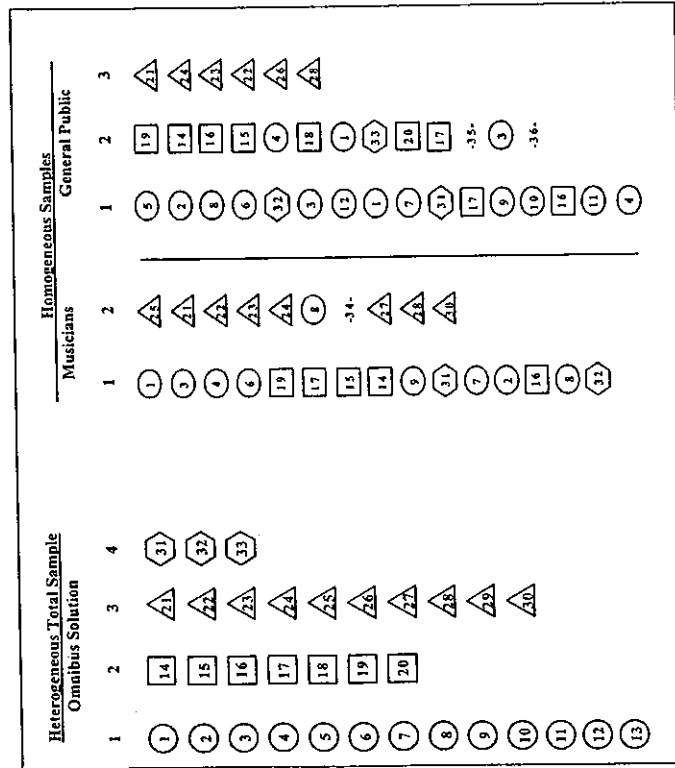


Figure A. Dimensions of Auditory Style: Group specific factorial solutions.

It is of interest that 3 items not loading onto one of the factors in the Omnibus 4-factor solution re-surfaced in one of the subgroup-specific factors. See Table 6.

Finally, the two factor solution for musicians was tested for an associated relationship with the Auditivity Scale, and both of these were found to be highly correlated: Factor 1 ($r = .84, p < .001$); and Factor 2 ($r = .79, p < .001$).

Table 7
Items of specific music involvement

#	Age*	Item
39.	C	It felt to me as though I was playing the instrument of my choice.
40.	C	I had feelings of being different from the other children who were not learning an instrument.
41.	C	I spent time producing expressive sounds on my instrument.
42.	C	I had a certain "feeling of power" when I produced some sounds with my instrument.
43.	C	I had a "feeling of comfort" when I produced some sounds with my instrument.
44.	C	I attempted to imitate sounds qualities of other performers with my instrument.
45.	C	I attempted to imitate sound qualities of nature with my instrument.
46.	C	I liked to show off through the sounds I could produce on my instrument.
47.	T	I felt that to the degree to which I was able to master a piece or technique, influenced the degree to which I felt I was in control of my life.
48.	T	I felt my parents' approval of me was dependent on my success as a musician.
49.	T	I identified more with ensemble performers than soloists.
50.	T	I found myself playing on my instrument at times of sadness, loneliness, fear, or apprehension.
51.	T	I had felt that the reason I was never really motivated to attempt to overcome frustrations of peer interactions and academic challenges, was because I could always escape into my own world of music (sound) making.
52.	T	I had felt that because I had such an intense interest with music I was not inclined to become involved with any other pursuits.
53.	A	I am uncertain if I actually heard a musical sound (motif or phrase) rather than imagining it.
54.	A	When I imagine seeing music notation, I imagine hearing the notes.
55.	A	When I cannot hear my instrument during a performance, I feel "I am lost".
56.	A	I can tolerate inexactness of musical pitch. (R)**
57.	A	I feel assaulted by eighth and quarter tones.
58.	A	I enjoy improvising with sound sonorities on my instrument.
59.	A	I feel that through playing my instrument I re-connect with the child in me.
60.	A	When I practice by myself I find that my mouth has fallen open and/or my eyes have closed.
61.	A	My understanding of another person is heightened when we perform music together.

* AGE = C: "As a child/youngster"; T: "As a teenager"; A: "As an adult".

** (R) = Reverse Order or Negative Tense.

Further, they reported a tendency to more often spend time producing expressive sounds on their instruments ($t = 2.50, df = 154, p < .05$), had a certain "feeling of power" when producing sounds ($t = 2.60, df = 154, p < .01$), but only rarely attempted to imitate the sounds of nature ($t = 2.35, df = 154, p < .05$). In addition, they more often attempted to imitate other performers, liked to show off with their

instrument more frequently, and had stronger feelings of being different from other children who were not learning an instrument.

Further, the musicians demonstrating higher Auditory Scale scores (> 50% musicians) reported that as adolescents involved with musical activity, they significantly more often played their instrument as a means of coping with affective states and moods involving sadness, loneliness, or apprehension ($t = 3.87, df = 154, p < .001$), felt significantly less inclined to become involved with other pursuits because of their intense interest in music ($t = 3.12, df = 154, p < .002$), and significantly more identified their ability to escape into their own private world of music and sound making as the reason they lacked motivation to overcome the frustrations of poor peer interactions or academic challenges ($t = 4.16, df = 154, p < .001$). Further they reported a tendency to sometimes feel that their parents' approval was dependent on their success as a musician ($t = 2.27, df = 154, p < .05$), and that the degree to which they mastered a piece of music influenced the degree to which they felt some control over their own lives ($t = 2.87, df = 154, p < .01$).

Finally, the musicians demonstrating higher Auditory Scale scores (> 50% musicians) reported a significantly increased incidence that as adults their understanding of another person is always heightened if they perform music together ($t = 4.50, df = 154, p < .001$). In addition they reported a tendency to more often feel able to reconnect with their "inner-child" by playing their instrument ($t = 2.35, df = 154, p < .05$), more often hear internal sounds when they imagine notation, feel psychologically "lost" when unable to discern their instrument from the rest of the orchestra, find themselves more often in a trance-like state when practicing alone, and are more intolerant of pitch intonation errors to the extent of feeling "assaulted" by quarter-tones.

DISCUSSION

The results of the current study seem to indicate the presence of a personality-based cognitive trait grounded on predisposition or sensory preference for audition — referred to as Auditory Style. The study did not attempt to indicate the presence of "auditive" versus "non-auditive" individuals, especially since traits and cognitive styles vary along a continuum. The study did, however, attempt to evaluate to what extent Auditory Style may be a basis for processing information and a general psychological orientation among individuals. The findings demonstrate that Auditory Style is normally distributed among everyday ordinary individuals from the general public, and hence does not seem rooted on the development of musical ability or formal instrument-training. Such a presupposition is perhaps best illustrated by the apparent percentage of individuals from the general public who scored in the higher distribution akin to high-scoring professional orchestra musicians, and a percentage of professional orchestra musicians who scored in the lower distribution akin to low-scoring individuals from the general public. That is,

some professional orchestra musicians demonstrated the same Auditory Scale scores as did members of the general public who clearly do not have the skills or expertise to perform on the concert platform. This finding might be seen as further evidence that humans are indeed predisposed for musicality; some individuals who retained this predisposition go on to become professional musicians and even world class performers, while others choose the medical profession, academic life, or other vocations. Nonetheless, the results point out that professional orchestra musicians occupy the higher portions of the distribution, and this is on average significantly greater than the general public.

The current study was successful in interpreting the underlying dimensions of Auditory Style by providing a clear factorial solution. The solution pointed to four underlying dimensions of Auditory Style: Awareness of auditory-specific identity and orientation; Responsiveness to music; Sensitivity to the affective parameters of voice and soundscape; and Preference for intoned textual settings. However, among the questions that were raised during the inception and development of KAAS, was the concern that Auditory Style might not surface in one distinct configuration. The inference here is that a diversity of Auditory Styles may have developed, been acquired, or even preserved by some individuals. If Cognitive Styles are largely a function of interaction with the environment, then clearly they are fluid to some extent; certain individuals may even have one preferred stylistic profile at one stage of life, while another stylistic profile can be preferred at another stage of life (Sternberg and Grigorenko, 1997). Hence, it seemed logical to hypothesize that differing temperaments particular to Auditory Style may develop, and are reinforced, by specific experiences, situations, or tasks throughout life. The study, then, explored such a premise through a planned post-hoc re-factorization of the Auditory Scale relating to more homogeneous subgroup samples of professional orchestra musicians versus the individuals from general public. The results clearly demonstrate that the Awareness factor (the most prominent dimension of Auditory Style) is the dominating dimension that differentiates between professional musicians and non-musicians. From the analysis two unique derivatives of the original Omnibus 4-factor solution surfaced — and these seem to be more suitable models to accurately describe the data. For example, regardless of sample subgroup, items from the original Awareness dimension remained in the first factor (even though some changed their subsequent loading position). In addition, both subgroups demonstrated a design whereby the original fourth factor amalgamated with the new first and/or second factors. Finally, both solutions retained the original third factor intact as an independent component dimension. Nevertheless, the notable differences between the models is the merging of the original first and second factors to a new first component among the musicians, while the original second factor was retained as an independent component among general public. It is most interesting to observe the loadings of specific key items which clearly play a functional role among the factorial designs of each subgroup (for example, compare

the primary item #1 on the foremost component). Finally, it should be pointed out that 3 items with did not load onto one of the original Omnibus 4-factor solution of the heterogeneous sample, re-surfaced when the items were re-factored with homogeneous sub-samples; a situation that would indicate that each is at an equal diametrically opposing point to cancel the items from loading altogether. Remarkably, the item that loads onto the musicians' second factor (*i.e.*, Sensitivity) is related to the use of hearing for gathering information about location of objects from the environment, while among the general public the two items which surface on their second factor (*i.e.*, Responsiveness) deal with the intolerability of pauses (*i.e.*, lack of sound or silences) during conversation, or silent environment.

Perhaps, the diversity of Auditory Style (as seen in the distinct factorial solutions) sheds light on group-specific personality traits. The fact that musicians may have a characteristic personality structure is certainly not a novel idea. Many studies have documented specific personality profiles of musicians (Bullione and Lipron, 1983; Dyce and O'Connor, 1994; Hamilton, Kella and Hamilton, 1995; Kemp, 1981a; 1981b; 1982a; 1985; Marchant-Haycox and Wilson, 1992; Wilson, 1984; 1994; and Wubbenhorst, 1994). Among the possible explanations for such individual developments are biologically innate predispositions, and the emotional sensitivity for sound attached to specific experiences. Accordingly, as musicians move into music performance as a career — which happens at a very early stage even before the formation of personality is completed — they become enmeshed with the musical experience itself, and often find it difficult to differentiate between who they are and how they play. The *performer* and the *performance* become one. This concept has recently been illustrated in Davidson's (2002) report of an 8-year follow-up study on the emerging music identity of solo performers. Accordingly, overtime several key attributes emerged which clearly marked participation in music (*i.e.*, music performance) as the key determinant of self-concept, as well as the critical means for self expression and intimacy. Davidson's findings also indicate that emotional and motivational aspects of the personality emerged (or were developed), which enabled performers not only to sustain their love of music, but also to feel that music is the stabilizing factor in life. That is, music was not only an important determinant of self-concept, but of psychological balance. Davidson concluded that performers see music as highly integrated with self.

It is of interest, then, that the current study reinforces the above concept, which follows the developmental processes of musicians (as children/youngsters) who seem to experience a growing acuteness of their awareness and identity with sound and auditory style, strengthened by their responsiveness to and preferences for these experiences. For example, the factorial design involving the two component model clearly illustrates the fusion (seen by item-intrusion) of Responsiveness and Preference which link together with Awareness into one overriding dimension representing the developing auditory-specific identity. Unlike professional orchestra musicians, individuals from the general public even if they acquire music skills and

felt as if they should have answered in a certain way as they might have believed something about how levels of auditory sensitivity relate to music performance and performers. Hence, final interpretation of the instrument, and the findings thereof, must be made with some caution. Yet, looking at the results from a broad perspective, the current study underlines the concept of a personality-based cognitive trait and orientation grounded on innate predisposition or sensory preference for audition. Like other Cognitive Styles, Auditory Style highlights behavioral attitudes, and when added to the more standard measures of ability may predict aspects of human performance, has implications for a host of settings including schooling, and sanctions the accessibility of circumstances available over life-span development such as occupational choice. Sternberg and Grigorenko (1997) believe that the study of Cognitive Styles provides a much needed interface between research on cognition and personality. A similar notion can obviously be said about the exploration of Auditory Style. Finally, even if it is to be concluded that psychologically based personality sources do not have a significant relationship to cognitive styles, but rather are moderated by styles in their effects on behaviors (Riding and Wigley, 1997), then most certainly the study of Auditory Style is an important link substantiating the variation among developmental consequences of innate predisposition for audition².

(2) Acknowledgment. The author wishes to acknowledge Professor John A. Sloboda (Keele, UK) for his overall support and guidance of the study. In addition, gratitude is offered to Dr. Mitch Waterman (Leeds, UK) for his statistical advice and general assistance during the development of KAAS. Finally, great thanks is offered to all the world-class players who took part in the survey.

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play on a regular basis with amateur orchestras or ensembles, do not demonstrate personality structures that are similar to professional musicians. Most significantly, naive musician performers do not seem to experience the fusion of auditive-specific identity and music performance experiences. The current study, then, also suggests that while everyday ordinary individuals from the general public may demonstrate higher Auditory Scale scores, their "stylistic profile" (i.e., the underlying dimensional make-up as represented in the most suitable factorial design) is dissimilar to the profile as demonstrated by professional orchestra musicians.

The final goal of the current study was to compare among the professional orchestra musicians themselves using their Auditory Scale scores as a grouping variable. It must be remembered that all the musicians were similar on all descriptive, demographic, and professional variables. Yet, differences between these two subgroups surfaced concerning characteristic behaviors related to musical development and preoccupation with instruments. Most specifically, the study found that musicians with higher Auditory Scale scores:

- ...more often produced expressive sounds on their instruments
- ...more often felt emotional "power" or "comfort" while producing sounds
- ...more often played their instrument while sad, lonely, or apprehensive
- ...more often attempted to imitate other musicians
- ...more often attempted to "show off" with their instrument
- ...more often felt "different" from children not learning any instrument
- ...more often felt that parental approval was dependent on musical mastery
- ...more often felt that performance proficiency was a reflection of control over life
- ...more often felt that musical talent and preoccupation justified a general lack of motivation to overcome academic and social frustrations
- ...more often felt that music rekindled the "child-like" part of their soul
- ...more often felt that they needed to perform with someone in order to understand them
- ...more often felt "lost" if unable to hear their sound distinctly from the rest of the orchestra
- ...more often felt "assaulted" by discrepancies of intonation
- ...more often heard internal sounds when imagining notation

As far as the two musician groups are concerned, these differences seem to highlight the developmental nature of an Auditory Style as a personality-based cognitive trait. More than a *sensory preference* this style may be a *psychological orientation* that navigates (to some extent) the musician's perception of self, others, and the world around them.

Clearly while KAAS seems to highlight developmental differences among musicians themselves, as it is a survey based on retrospective memory there is no way to know if the responses are imprecise (because of poor memory) or off-centered (because of specific bias). That is, there is a possibility that some musicians may have

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• **Desarrollando el KAAS (Keele Assessment of Auditory Style):
Un estudio analítico factorial del rasgo cognitivo
de predisposición para la audición**

El presente trabajo explora la existencia de una orientación auditiva específica entre individuos ordinarios del público general y músicos profesionales de orquesta (N=256). Se denomina Auditory Style (Estilo de Audición) al rasgo cognitivo base de la personalidad basado en la predisposición o la preferencia sensorial para la audición. El estudio desarrolló y clarificó el Juicio Keele de Estilo de Audición (KAAS), y examinó las dimensiones subyacentes a través del factor analítico. El trabajo concluyó que el Estilo de Audición está normalmente distribuido, y aunque no está basado en el desarrollo de la habilidad musical, los músicos profesionales de orquesta demostraron claramente aptitudes mayores que los individuos del público en general. Las cuatro dimensiones subyacentes del Estilo de Audición se interpretaron como: conocimiento, sensibilidad, sensibilidad y preferencia. El análisis mostró distintas soluciones factoriales entre los músicos y el público general, apuntando a la posibilidad de que existan perfiles estilísticos característicos de cada grupo. Finalmente, mostró que los resultados más altos de los músicos profesionales de orquesta configuraban un grupo característico de comportamientos y aptitudes.

• **Sviluppo della Valutazione Keele dello Stile Uditivo (KAAS):
uno studio analitico-fattoriale del tratto cognitivo
della predisposizione all'ascolto**

Il presente studio indaga l'esistenza di un orientamento specificamente uditivo fra individui comuni appartenenti al pubblico e orchestrali di professione (N=256). Uno Stile Uditivo si definisce come un tratto cognitivo della personalità basato sulla predisposizione o sulla preferenza sensoriale per l'ascolto. Lo studio ha sviluppato ed affinato la Valutazione Keele dello Stile Uditivo (KAAS), ed esaminato le dimensioni soggiacenti mediante un'analisi fattoriale. Ne è emerso che lo Stile Uditivo è normalmente distribuito, e sebbene non si fondi sullo sviluppo dell'abilità musicale, i professori d'orchestra hanno mostrato con ogni evidenza punteggi significativamente superiori rispetto a quelli del pubblico. Le quattro dimensioni soggiacenti allo Stile Uditivo sono state interpretate come: Consapevolezza, Reattività, Sensibilità e Preferenza. L'analisi dei risultati ha mostrato soluzioni fattoriali distinte fra i musicisti ed il pubblico, indicando la possibilità che per ogni sottogruppo esistano precisi profili stilistici. Il presente studio ha evidenziato infine che i musicisti di professione con punteggi maggiori hanno presentato un insieme discreto di comportamenti ed atteggiamenti caratteristici.

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- Développement de l'évaluation du style auditif telle qu'elle est pratiquée à Keele : Etude analytico-factorielle de la prédisposition d'un trait cognitif à l'audition

On étudie ici l'existence d'une orientation spécifiquement auditive chez le commun des mortels, des personnes qui composent le public aux musiciens d'orchestre professionnels (N = 256). Par style auditif, on entend un trait cognitif basé sur la personnalité et fondé sur la prédisposition ou la préférence sensorielle. L'étude développe et affine la méthode d'évaluation du style auditif mise au point à l'Université de Keele (*Keele Assessment of Auditory Style* ou KAAS) et étudie les dimensions sous-jacentes par le biais de l'analyse factorielle. Le style auditif se révèle être normalement réparti, et, bien qu'il ne s'enracine pas sur le développement d'un aptitude musicale, les résultats des musiciens d'orchestre professionnels sont significativement supérieurs à ceux des participants issus du public général. Quatre dimensions sous-tendent le style auditif : la conscience, l'aptitude à répondre, la sensibilité et la préférence. L'analyse des résultats fait apparaître que les solutions factorielles des musiciens sont distinctes de celles du public général, ce qui conduit à penser que chaque sous-groupe a un profil stylistique caractéristique. Enfin, les musiciens d'orchestre professionnels qui obtiennent les meilleurs résultats témoignent d'un ensemble discret de comportements et d'attitudes caractéristiques.

- Entwicklung des Keele Assessment für Auditive Stile (KAAS):
Eine faktorenanalytische Untersuchung zur Prädisposition
auditiver kognitiver Stile

Die vorliegende Studie untersuchte die Existenz einer spezifisch auditiven Orientierung bei Personen in der Normalbevölkerung und bei professionellen Musikern (N=256). Eine kognitive Eigenschaft innerhalb der Persönlichkeit, die die Prädisposition oder sensorische Präferenz für auditive Ereignisse umfasst, wollen wir als Auditiven Stil bezeichnen. In dieser Untersuchung wurde die Keeleer Skala für Auditive Stile weiterentwickelt und ihre zugrunde liegende faktorielle Struktur untersucht. Es konnte gezeigt werden, dass der Auditive Stil normalverteilt ist, und — obwohl er nicht an die Entwicklung musikalischer Fähigkeiten gekoppelt ist — professionelle Orchestermusiker höhere Skalenwerte als die Probanden der Normalbevölkerung erreichen. Die zugrunde liegenden vier faktoriellen Dimensionen des Auditiven Stils wurden wie folgt interpretiert: Bewusstheit, Reaktivität, Sensibilität und Präferenz (Gefallen). Eine post-hoc Analyse zeigte für Musiker und für die Kontrollgruppe deutlich unterschiedliche faktorielle Ergebnisse, die möglicherweise auf für beide Untergruppen unterschiedliche Profile verweisen. Abschließend belegen die höheren Werte der professionellen Orchestermusiker eine nur bei dieser Gruppe auftretenden charakteristische Verhaltensweise und Einstellung.

Les conséquences fondamentales du paradigme connexionniste au sein des processus cognitifs dans leur rapport à la création musicale

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• RÉSUMÉ

La mise en perspective induite par le changement de consensus auguré par l'adoption du connexionnisme laisse apparaître une influence beaucoup plus profonde du paradigme de la connaissance au sein de la composition. Le propos de cet article est dans un premier temps, d'analyser suivant une approche épistémologique, les conséquences résultant d'un tel changement, dans le domaine de la cognition et plus particulièrement dans la compréhension du fait musical et l'élaboration de théories compositionnelles. Dans un deuxième temps, la nécessaire présence de phénomènes non linéaires aboutira à la constatation de la coexistence possible de deux types nettement différenciés de pensées : l'un de nature symbolique, l'autre d'essence chaotique. Nous montrerons par une modélisation élémentaire que ces modes ne procèdent pas à véritablement parler d'une dichotomie, dans la mesure où un système dynamique peut suivant la variation des paramètres basculer brusquement d'un comportement stable à une configuration chaotique. Cette distinction conceptuelle suggère une redéfinition de l'objet musical en termes d'attracteur et implique d'autre part une limitation fondamentale quant à la prédictibilité de certains phénomènes cognitifs. Cette limitation impose d'ailleurs une reconsidération du concept de théorie musicale, lequel ne peut plus se dissocier à présent d'une composante intrinsèque de la nature ontologique du phénomène musical à savoir la dimension temporelle.

INTRODUCTION

Les réalisations de la pensée computationnelle, en composition, laissent apparaître que le système sur lequel elles reposent, n'a pas été en mesure de répondre aux attentes qu'il avait suscitées (Dufourt, 2000). Les œuvres contemporaines se sont élaborées dans leur ensemble, à partir de modèles abstraits. Cette situation a créé *ipso facto* une connectivité apparente entre des théories symbolistes, et le fait musical lui-même, sans pourtant que cette question ait fait l'objet d'un examen approfondi (le