



## The development of the revised version of the Formal Characteristic of Behaviour – Temperament Inventory FCB-TI(R)



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### ABSTRACT

The Regulative Theory of Temperament (RTT), developed by Jan Strelau, describes human's behaviour in formal characteristics expressed in six temperamental traits: briskness, perseverance, sensory sensitivity, endurance, emotional reactivity and activity. Theory validity was supported based on operationalisation of traits via the Formal Characteristic of Behaviour – Temperament Inventory (FCB-TI). Further research revealed shortcomings in the content of the Briskness and Sensory Sensitivity scales, lack of data on Rhythmicity and the need of empirical evidence for the postulated temperamental structure. This paper describes the preparation and validation of a revised version of the FCB-TI. The item selection process was based on exploratory factor analysis and the structure of temperament was confirmed using confirmatory factor analysis. The results confirmed a seven-factor structure of temperament. The revised version of the FCB-TI(R) includes 100 items and seven scales: six analogical as in the FCB-TI, and a new one - Rhythmicity, all with a 4-point Likert response scale. The content of the Briskness and Sensory Sensitivity scales was changed. Internal consistency and test-retest reliability of the scales were satisfactory. Relations to other temperamental/personality measures were established. The FCB-TI (R) proves to be a robust operationalisation of RTT with a confirmed internal structure and acceptable psychometric properties.

### 1. Introduction

The Regulative Theory of Temperament (RTT), developed by Jan Strelau, is an internationally recognised theory based on Tomaszewski's (1978) theory of action, Pavlov's (1928) and his followers' concepts of nervous system properties, Gray's (1964) construct of arousability, and the idea that temperament moderates humans' reactions in different environmental conditions. The RTT theory has its roots in the old tradition that involves interpreting the four Hippocrates' and Galen's temperament types in terms of formal characteristics, such as time and energy. According to Kant (1912), fast and slow acts are typical for choleric and phlegmatic types (consecutively), whereas deep and shallow emotions are present in sanguine and melancholic temperaments. Wundt (1887), who limited temperament to emotions, distinguished two dimensions, on which temperaments differ: strong – weak and fast – slow. In contemporary psychology, Allport (1937) and Diamond (1957) also referred to the temporal and energetic characteristic of emotions and behaviour, when defining temperament.

Although the RTT refers to the tradition that emphasises the role of formal characteristics specific to each temperament, it differs

essentially from the traditional approach. In broad psychometric studies several components considered as temperament traits, referring to the temporal and energetic characteristics, have been identified. The RTT also offers an evidence-based psychometric tool – the Formal Characteristics of Behaviour – Temperament Inventory, that allows to measure temperament traits as proposed by the RTT theory, the description of which was included in the *Encyclopedia of Personality and Individual Differences* (see Zawadzki & Strelau, in press).

According to Strelau (2008, p. 88) temperament refers to basic, relatively stable personality traits expressed mainly in the formal (temporal and energetic) characteristics of reactions and behaviour. These characteristics manifest themselves from early childhood and have their counterpart in animal world. Although temperament is originally determined by innate neurobiochemical mechanisms, it undergoes gradual changes due to maturation and individual-specific interplay between the genotype and the environment. The definition was also elaborated in the form of ten basic RTT postulates (Strelau, 1996, 2008), which assume that temperament manifests itself in the formal characteristics of behaviour (postulate 1) which may be described in terms of temporal and energetic traits (postulate 2) that differ among

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people and are relatively stable for the same person (postulates 3 & 4). Temperamental traits are present from early infancy (postulate 5), are common for people and animals (postulate 6), are biologically determined (postulate 7), but still are subject to change during ontogenesis (postulate 8). Finally, temperament regulates the relationship between the subject and his or her environment and has its greatest influence in difficult and extreme situations (postulates 9 & 10), determining humans' possibilities of external stimulation processing and preferred ways of stimulus regulation. A particular and less adaptive combination of temperamental traits may constitute a temperament risk factor (TRF; see: Strelau, 1998, 2008) for the development of somatic and psychological dysfunctions, including heart disease, somatic complaints, anxiety, affective and personality disorders, alcohol abuse and burnout syndrome (Fruehstorfer, Veronie, Cremeans-Smith, & Newberry, 2012; Hintsä et al., 2016; Rzeszutek, Oniszczenko, Schier, Biernat-Kałuża, & Gasik, 2015; Strelau & Zawadzki, 2005, 2011; Zawadzki & Popiel, 2012; for the summary of selected studies see Strelau, 2008).

Originally, the RTT postulated that the energetic aspect of behaviour comprises two main dimensions: reactivity (influencing the intensity of reactions to stimuli, which refers to Gray's construct of arousability, assessed by two opposite, negatively related thresholds: sensitivity and endurance) and activity (as a regulator of arousal). Analyses with the use of the original version of FCB-TI did not confirm this hypothesis; reactivity needed to be divided into a) emotional reactivity (emotional sensitivity and endurance) and (almost orthogonal) b) endurance and c) sensory sensitivity. The analyses confirmed, however, the hypothesis about activity (comprising activity as a direct and indirect source of stimulation). Within the temporal domain, the several characteristics were distinguished: speed, tempo, recurrence, persistence, rhythmicity and mobility, later classified to briskness and perseveration, as two forms of lability, reflecting elicitation and termination of the reaction (Goryńska & Strelau, 1979). The rhythmicity did not load both factors, so it was excluded from the final version of the original tool. Finally, the RTT theory concluded that temperament is reflected in six traits (Strelau & Zawadzki, 1993) defined by different sort of behaviour (*subdimensions*). Within the TCB domain, the RTT distinguished two traits:

1. *Briskness* – defined by *speed*, *tempo* and *mobility*, is a tendency toward quick reaction, keeping a high tempo of activity and shifting easily in response to changing environmental conditions.
2. *Perseveration* – defined by *recurrence* and *persistence*, is a tendency to continue and/or repeat behaviour after cessation of stimuli which evoked this behaviour.

ECB domain comprised four traits:

3. *Sensory Sensitivity* – defined as the ability to react to visual, auditory, gustatory, olfactory and tactile sensory stimuli of low stimulatory value.
4. *Endurance* – defined by *endurance to distractors* and *to fatigue*, is an ability to maintain adequate reactions in situations demanding long-lasting and high-stimulative activity.
5. *Emotional Reactivity* – defined by *emotional sensitivity* and *emotional endurance*, is a tendency to react intensely to emotion-generating stimuli.
6. *Activity* – defined by *direct* and *indirect sources of stimulation*, is a tendency to undertake highly stimulative behaviours or to supply external stimulation through one's behaviour.

According to the RTT, the biological basis of temperament comprises physiological mechanisms responsible for processing stimulation into arousal (as well as its onset and duration) and for the regulation of stimulation in order to maintain the optimal level of arousal. These

integrated functions of biological mechanisms make it legitimate to expect several relationships among temperament traits, especially between activity and other ECB traits.

As mentioned, the RTT was operationalised by the Formal Characteristic of Behaviour – Temperament Inventory (FCB-TI), developed by Strelau and Zawadzki (1993, 1995), the original Polish tool which was widely used for clinical and scientific purposes and adapted to different languages and cultures (e.g., American, Chinese, Dutch, Finnish, German, Italian, Russian, South Korean, and Ukrainian; see: De Pascalis, Zawadzki, & Strelau, 2000; Hintsä, Hintsanen, Jokela, & Keltikangas-Järvinen, 2013; Liu, Chen, Yang, & Zhang, 2015; Strelau, Mitina, Zawadzki, Babajewa, & Menczuk, 2005; Zawadzki et al., 2001; see also Zawadzki, 2002). Analyses conducted with the use of cross-cultural version of FCB-TI developed basing on data from eight countries (The Netherlands, South Korea, Germany, Poland, Russia, Ukraine, USA and Italy) revealed a parallel structure of TCB and ECB scales as in the Polish version, with the exception of the mobility subdimension (described below). Similar intercorrelations among scales as well as good psychometric properties (internal consistency of scales ranging from 0.70 to 0.83) have been obtained.

Although the original tool presented acceptable psychometric properties (see: Strelau & Zawadzki, 1993, 1995), the theoretical approach of inventory development led the authors to base the process of item selection only on item analysis, which did not allow to fully confirm the 6-factor temperamental structure of the original tool. Further research also showed that the status of TCB was unclear because of the exclusion of rhythmicity, which could not be classified into briskness and perseveration in the original research (Goryńska & Strelau, 1979), making the status of this trait ambiguous. Later research, however, allowed extracting it into a separate factor along with openness (Strelau & Zawadzki, 1996; Zawadzki & Strelau, 2010). Still, previous research done by Thomas and Chess (1977) as well as Windle and Lerner (1986) suggested that rhythmicity is one of the basic domains of temperament among children, strongly related to their adaptive potential. Taking into consideration the analyses mentioned above, it was decided to include rhythmicity in the new version of the inventory, according to earlier conceptualisation of TCB in the RTT (Strelau, 1983), defined as *regularity of time intervals between homogenous reactions, which manifests in eating and sleeping habits as well as driven lifestyle*.

Finally, some imperfections were found in two scales: Briskness and Sensory Sensitivity. Regarding the Briskness scale, its original version consisted of three subdimensions: speed, tempo and mobility. However, cross-cultural studies did not confirm this structure, as mobility proved to be an unstable component that also loaded on Perseveration (Zawadzki, 2002). Regarding Sensory Sensitivity, its psychometric properties were weaker comparing to other scales (with higher skewness and lower reliability coefficients). Kantor-Martynuska (2012) emphasised the need for revision of this scale's content, as it did not respect the multimodal character of the trait.

Taking into account the conclusions drawn from different studies that used the FCB-TI, we decided to revise the original version of this tool, aiming to: 1). verify the internal structure of the tool by implementing different methodology for item selection, based on factor analysis instead of simple indices of item analysis, 2). improve the psychometric and statistical properties of all scales through changes in their content as well as the response format (from a "Yes/No" format to a 4-point Likert scale), 3). improve the internal structure of the Briskness and Sensory Sensitivity scales, 4). add one more TCB scale – Rhythmicity, 5). adapt original items' content to cultural (socio-political and technological) changes taking place in modern societies within last twenty five years, and 6). increase the economicity of the tool by reducing the number of items. From a theoretical point of view, studies intended to verify/replicate the internal structure of temperamental dimensions, their interrelationships, and relation to other personality/temperament dimensions (Cyniak-Cieciura, Zawadzki, & Strelau, 2016).

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