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Discussion

## Reconsidering Reuven Tsur's *Poetic Rhythm: Structure and Performance—An Empirical Study in Cognitive Poetics*

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### Abstract

When reviewing Tsur's book for this journal in 2001, I praised it as the most thorough study we now have of performance techniques in reciting verse, but strongly criticized two of his key concepts. I argued that (1) the perception-oriented theory of meter cannot identify unmetrical lines and (2) the limited capacity of short-term memory fails to provide a general explanation why (as Tsur claims) the longest verse line we can perceive as a rhythmical unit without an obligatory break is decasyllabic. Subsequent research has, however, convinced me that I was wrong on both accounts, particularly as to the constraints of short-term memory on verse-length. This paper gives the evidence for that change of view.

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Reuven Tsur's 1998 study *Poetic Rhythm: Structure and Performance—An Empirical Study in Cognitive Poetics* performed, in his words, “a small Copernican revolution” (Tsur, 1998: 14, 26, 29, 83 and later) in cognitive poetics by devising a perception-oriented theory of meter based on Gestalt theory, laboratory speech research, and a crucially important hypothesis about the limited channel capacity of short-term memory. In my review of Tsur for the *Journal of Pragmatics*, I cast doubt on the basis of this revolution, calling it one by authorial fiat rather than accomplishment, but did praise the book's valuable speech research (Willett, 2001: 333): “This work represents in scope, depth, and precision of aesthetic analysis the single most important body of research into the

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rhythmical performance of poetry.” My skepticism about his revolutionary claim was based on criticism of two key theories, which I summarize here to provide a context for my reconsideration of their validity.

First, Tsur used Gestalt laws of perception to argue that poetic rhythm is not a rule-checking procedure to determine which mappings of stress patterns onto metrical structure are acceptable and which are not. It follows as a consequence that rhythm can only be perceived in performance. “No reader,” he asserts, “can ever experience the interaction of the metrical pattern and the stress pattern, or the sound stratum of a poem, unless it is *performed* in some way.” (Tsur, 1998: 26; italics original) I objected to this on the grounds that the elimination of all fixed limits to metrical acceptability other than the ability and willingness of a reader to rhythmically perform verse eliminates any objective measure of metrical competence. If we locate rhythm in ability and willingness, we locate it in the total number of readers who fulfill these two criteria. All lines of any type are therefore potentially performable, and none can be rejected as unmetrical.

Second, Tsur evoked George A. Miller’s classic 1956 paper on the limits of our ability to process information in short-term memory as a theoretical support for his perception-oriented theory of meter. Miller showed that the maximum processing capacity of short-term memory, or working memory as it is now termed, was  $7 \pm 2$  items. The competent reader of verse who meets a conflict between the stress pattern and the metrical pattern must find ways to resolve the conflict in a rhythmical performance before the acoustic memory trace fades. If the resolution is not completed before the trace vanishes, competent rhythmical performance may fail. Since the limited capacity of working memory cannot be expanded, the reader must resort to (1) over-articulation of phonemes and word boundaries and (2) grouping into simple units, strategies that are persuasively demonstrated by Tsur’s experimental evidence (Tsur, 1998: 73–82). More importantly, he asserted that the limited capacity of working memory explains why the longest verse line we can perceive as a rhythmical unit without an obligatory break is decasyllabic. The assertion implies that human cognition, being universal, will also limit the verse-length of all non-English poetries. I objected to this on the grounds that Greek meter, as we *currently* understand it, has an upper boundary of about eight metra (where metra are repeatable units of 3–6 syllables each) for verse-length in choral and dramatic lyric poetry, with a few cases exceeding the boundary by a considerable margin. I cited Pindar’s Pythian 4, strophe 3 (Willett, 2001: 336), which has 20 syllables without caesura, against Tsur and concluded that Greek verse-length seemed “a fatal problem for his thesis.”

Of these two objections, the first now seems to me only trivially true and the second wrong on the basis of new research. I can dispense with the first quite easily, but the second, which is crucial to Tsur’s perception-oriented theory of meter, will require considerably more explanation.

As to my first objection, while it is certainly true that to posit rhythm in the ability and willingness of a reader means in effect to posit it in all possible readers who meet the requirements, the objection failed to appreciate the full force of the qualifier “ability” to detect and reject certain kinds of lines as unmetrical. Ability here must mean, as I’m sure it does for Tsur, not only knowledge of the relatively simple rules for writing well-formed accentual-syllabic verse or the vocal resources to recite it effectively, but familiarity with the whole historical tradition of that meter from its origins in the fifteenth century to the

present. This historical familiarity with the tradition of rhythmical craftsmanship carries its own inherent standards of assessment. Readers, just as poets, learn to understand metered verse by studying how other poets have handled and mastered the craft over the past centuries. If, for example, a reader of ability comes across a passage like the following partially-rewritten lines of Shelley<sup>1</sup> (adapted from *Attridge, 1995: 136 and 251–252*) in a iambic pentameter poem, how will he or she respond?

- (1) Slavery had crushed him into his country's dust;  
/xxx/x/xx/x/
- (2) Or he was bartered for fame and for power,  
x/x/xx/xx/x
- (3) Which all inner impulses destroying,  
x//x/x\x/x
- (4) Makes man's will a prized item of free trade.  
\//x//xx//

To begin with, all four are clearly unmetrical by the conventional standards of iambic pentameter verse: the first has 12 syllables, a triple offbeat at the start and an impermissible promotion on “his;” the second has only four stresses; the third has a falling inversion (//xx) without its normal double offbeat in “all inner impulses” (//x/x\); and the fourth has six or seven stresses in a configuration where none can be easily demoted. A competent reader would immediately recognize that these lines are not simply subject to strong—even violent—variations of the kind we find in Donne, they are unmetrical by the 500-year tradition of the meter in English. Any attempt to perform them with a unified rhythm would, therefore, fail. At the point where ability has detected the rhythmic failure of the passage, willingness will refuse the effort at performance. The only recourse to the reciter is simply to read the lines as prose with normal accent, abandoning any attempt to perform them as iambic pentameter: no amount of over-articulation of phonemes and word boundaries or grouping can transform the lines into metrical verse of the given type. In my first objection, therefore, I failed to grasp a fundamental aspect of cognitive poetics. The demands of performance, given a competent reader who knows the tradition of English accentual-syllabic meter, will quickly reject unmetrical lines because no vocal resources can give them a rhythmical unity within the limits of working memory. Tsur himself notes (*Tsur, 1998: 351n4*), in response to criticism by statistical metricians like Marina Tarlinskaja, that Chapters 1–4 make it clear he does not believe just any type of line is allowable by his theory, and Chapters 1–2 in particular may also suggest how traditional metrical styles and period differences in rhythmical practice “may be generated by the processes suggested here.”

<sup>1</sup> Here is Shelley's original passage from *Queen Mab* VIII. 173ff.:

...slavery  
Had crushed him to his country's bloodstained dust;  
Or he was bartered for the fame of power,  
Which all internal impulses destroying,  
Makes human will an article of trade; ...

It is to working memory and my second objection that we now turn. This will require rather more background material, much of it unfamiliar to readers outside classics, to fully clarify the reasons for my revised thinking about the constraints of working memory on verse-length. I will try to make this as simple and comprehensible as possible for nonclassicists.

The current *opinio communis* among classical metrists is that between the death of Euripides in 406 BCE and the activities of the great Alexandrian scholars who produced editions of the dramatic and lyric poets in the third century BCE (detailed by Pfeiffer, 1968: 87–233), knowledge of fifth century lyric composition was effectively lost. The historical process of the loss is fairly simple. (1) The ancient poets may or may not have written down the music of their lyric songs, but the published texts of their works issued during the fifth and fourth centuries copied out the lyrics in *scriptio continua* as prose without line divisions. (2) The Alexandrian scholars then divided the lyric odes into short lines called *cola* [single metrical phrases of about 8–12 syllables in the definition of West (1982: 5–6)] without understanding the true units of lyric meter, which (as we shall see) were much longer. (3) The colometry they produced by dividing the lyrics of the older manuscripts into *cola* ranging from monometers to tetrameters was not standard throughout antiquity and is of no particular interest to modern scholars, because it is based on false metrical and rhetorical theories. (4) The music that might have given the Alexandrians a key to understanding choral lyric was lost, for the most part, during the fourth century. Even if the music did survive to the third century, Alexandrian scholars would have made no use of it because it was unintelligible. (5) The recovery of the true basis for Greek choral lyric only began with the publication of August Boeckh's monumental edition of Pindar, *Pindari opera quae supersunt*, in 1811. Over the course of the nineteenth and early twentieth centuries, other scholars like Wilhelm Christ, Ulrich von Wilamowitz-Moellendorff and Paul Maas developed a new theory of colometry that is now taken for granted by editors, metricians and historians of music. This colometry is based, not on the *colon*, but on the period as the fundamental self-contained unit of verse (West, 1982: 5); hence it is sometimes called a period-counting colometry, to distinguish it from the Alexandrian *colon*-counting colometry. Each period can contain up to eight or occasionally more *cola*, for a total length nearly three times the maximum postulated by Tsur. Pindar's Pythian 1, strophe 6, for example, has a 30-syllable period, closely followed by Nemean 5, strophe 5, with a 27-syllable period. Even longer periods can be found in the odes of Bacchylides.

Virtually all of the *opinio communis* has been strongly critiqued in recent years by scholars who went back to the ancient evidence and reviewed it without a modern bias (Fleming, 1975, 1996, 1999; Fleming and Kopff, 1992; Kopff, 1999 and the sources cited in these papers). Their research strongly supports the thesis that the Alexandrians did have access to musical texts and used them in colizing the dramatic and (*pace* Fleming and Kopff, 1992: 761) very probably the nondramatic choral lyric. Their *colon*-counting colometry is intelligible, coherent and attractive in itself. We are now in a position to reconstruct a rather different metrical history than the *opinio communis*. The composers of dramatic choral lyric wrote down the music as an essential tool for training singers. Performance texts with this musical notation were copied and used from the late fifth down to the end of the first century BCE. "In the middle of these three centuries," as Fleming (1999: 29) summarizes the evidence, "Alexandrian scholars were in a position to interpret

the performance texts on which they based, whenever possible, their own editions, particularly the line divisions. It would have been an easy and almost mechanical task to translate the author's musical phrases into the *cola* and verses that were recorded in ancient papyri and preserved, more or less faithfully, in Byzantine manuscripts. There is every reason to believe (and little or no rational basis for skepticism) that the *cola* of Alexandrian editions reflect the rhythmical intentions of fifth century dramatists." More recently, Rocconi (2003: 70–71) has suggested, in her review of Pöhlmann and West's *Documents of Ancient Greek Music. The Extant Fragments and Melodies*, that the musical fragments provide some confirming, though not unambiguous support, for musical notation in nondramatic lyric texts. But certainty about the ancient colometry is impossible, given the limitations of our current knowledge about ancient music. The safest procedure is to remember Maas' warning about the study of Greek metrics: despite much excellent theorizing, the field "has suffered . . . from the failure of scholars to distinguish between the certain data of the texts and the conjectures of theorists, which however long-established are still conjectures and as such open to question" (seconded by Fleming, 1996: 131). The current *opinio communis* about the modern period-counting colometry is a good example of this failure.

After completing my review of Tsur, I began to review the arguments in support of the Alexandrian colometry. I was immediately struck by the fact that its verse-length agrees closely with the maximum verse-length advanced by Tsur on the basis of working memory. His key insight into the constraints of working memory on versification was only limited by its reliance on Miller's 1956 paper. Modern research has shown that the capacity Miller discovered,  $7 \pm 2$  items, can be increased by chunking, the process of grouping information into smaller units that can be remembered as complete constituents rather than as a string of separate items. But the maximum capacity of working memory as measured by a pure memory test is not a reliable guide to its capacity during performance of a real-life task. The reliable usage capacity of working memory is estimated to be only around 4 chunks, not  $7 \pm 2$  chunks (Broadbent, 1975). One of the most thorough surveys of the evidence for working memory capacity (Cowan, 2001) suggests that it may even be somewhat smaller, around 3–5 chunks. Furthermore, the span is shorter for lists of polysyllabic words (frequent in Greek) than for lists of monosyllabic words, since longer words take longer to say and consequently fewer can be maintained (Baddeley et al., 1975). The restricted capacity of working memory is equaled by its restricted duration: without constant rehearsal, information stored in it decays within 3–20 s, and this decay is the cause of working memory loss (Brown, 1958; Kalat, 1998).

We use the on-line memory system called working memory in all language functions: reading, writing, speaking and listening. It functions rather like a temporary storage buffer, holding the segments of sentences "on-line" millisecond by millisecond as we process them in real time. The implications of working memory for our understanding of colometry, as I wrote in a recent paper (Willett, 2002: 10), should now be clear: "The perception of poetic rhythm, not its visual scansion in symbols, is essentially an auditory phenomenon to which syntax and semantics make a subsidiary contribution. Rhythm only exists when we hear a poem recited or we read it out loud. The silent articulation of a poem to ourselves by subvocalization also actualizes the rhythm, if in a more ghostly way. Absent the aural domain, rhythm is a mere abstraction. The auditory qualities of rhythm must,

therefore, be constrained by the limitations of working memory.” We have no reason to believe, I argued (Willett, 2002: 11–18), that Greek choral poetry was exempt from the limits of working memory, since those limits govern all perception and production of language. But one would think it was exempt on the basis of the current colometry for choral odes, where we commonly encounter periods running two to six times longer than anything we might predict from the limited capacity of reliable working memory. Whatever measure of its capacity we want to take, the modern period-counting colometry vastly exceeds it, while the Alexandrian colometry roughly matches it. The Alexandrian *cola*, at around 12 syllables with some 3–6 words, are short enough for working memory to process as rhythmic wholes and performable in a single articulatory breath.

So far as I know, C.J.M. Sicking is the only classical scholar who has ever shown the slightest awareness of the limits imposed on meter by working memory. During a discussion of the caesura in his *Griechische Verslehre*, he offers (Sicking, 1993: 52) the following observation: “Der durchschnittlich verhältnismäßig große Umfang griechischer Verse (der iambische Trimeter und der daktylische Hexameter enthalten z.B. 12 Elemente) veranlaßt den Hörer (bzw. den Vortragenden), die Wahrnehmung (bzw. den Vortrag) eines Verses abschnittsweise zu vollziehen. Das rhythmische Ganze wird in zwei (in gesungenen Versen manchmal mehr) als solche ‘übersehbare’, Teilsequenzen (von 5 bis 7 Elementen) gegliedert. Die aus der Wahrnehmungspsychologie bekannte Tatsache, daß ‘the span of immediate memory’ eines Menschen beschränkt ist,<sup>18</sup> dürfte hier eine Rolle spielen.”<sup>2</sup> Footnote 18 in the above German quotation cites Miller’s 1956 paper (though Sicking doesn’t list it in the bibliography) to support the claim that “‘immediate memory’ [=short-term or working memory] requires the verse to be divided into “‘surveyable’ sequential divisions,” two for the trimeter and hexameter and more for sung verse, which must include choral lyric. Sicking did not, however, consider where the equivalent of a caesura might be found in the period, or indeed how the period could be performed, given the limitations of working memory. I suspect there is a simple reason why he failed to follow up on his intuition concerning the need to segment sung poetry into many shorter sequences consonant with working memory: it would have called into doubt the very idea of the period as the fundamental self-contained unit, in West’s phrase, of Greek meter.<sup>3</sup>

Tsur was the first prosodist to appreciate the full ramifications of the relationship between working memory and meter in *Poetic Rhythm: Structure and Performance—An Empirical Study in Cognitive Poetics*. The complex research I have outlined and hopefully simplified for the nonspecialist in this paper has forced me, in all honesty, to revalue his groundbreaking study. I now consider that he has indeed performed a small Copernican revolution in metrics. The revolution should be followed by more detailed investigations of the ancient Greek evidence and the continued refinement of Tsur’s perception-oriented theory of meter across the full range of European verse systems. We all need to remember

<sup>2</sup> “The relatively large average size of Greek verse (the iambic trimeter and the dactylic hexameter, for example, contain 12 elements) forces the hearer (or the performer) to complete the perception (or the performance) of a verse in stages. The rhythmical whole is divided into two (in sung verse sometimes more) such ‘surveyable’ sequential divisions (of 5 to 7 elements). The well-known fact of perceptual psychology that ‘the span of immediate memory’ in humans is limited may play a role here.” (my translation)

<sup>3</sup> It is entirely possible that Sicking got his undocumented reference to Miller’s paper, and indeed the very notion that working memory constrains verse-length, from one of Tsur’s earlier papers, but I cannot prove it.

that academic opinions are mutable, the search for truth unending, and when that search invalidates an opinion, it ought to be publicly renounced.

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