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Why did dance evolve? A comment on Laland, Wilkins and Clayton (2016)

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Laland, Wilkins, and Clayton (2016) argue that human dance exploits neural circuitry that evolved to facilitate imitation. In this view, dancing requires the performer to adjust his or her movements to an external or internal beat, thus demanding correspondence between an auditory input and motor output. Laland et al. therefore suggest that imitative proficiency is crucial in dancing, and may have been favoured by selection to promote social learning. Laland et al. further propose that dance is an exaptation, a by-product of imitative proficiency. We argue that, in considering evidence from comparative research, this proposition prematurely dismisses the hypothesis that dance is an evolved display of motor skills and mate quality.

In ritualized form, and especially with choreography, dance skills can be improved by imitation. However, this does not preclude the possibility that selection built sex-specific and condition-dependent dance-related adaptations to facilitate mating success. Research indicates that opposite-sex individuals are attentive to sex-typical mate quality characteristics, such as male strength and female fertility, conveyed through dance movements (Fink, Weege, Neave, Pham, & Shackelford, 2015). Deriving these cues from dance movements of opposite-sex individuals does not require information about the dancer's ability to adjust to a rhythm. Yet, there is considerable variation in, for example, attractiveness assessments of male and female dancers, as predicted by Sexual Strategies Theory (Buss & Schmitt, 1993), suggesting that dancing proficiency is a sexually-selected adaptation.

Dance is a complex physical, emotional, cognitive, and culturally-ubiquitous social activity, characterized by intentional and rhythmic movements used to express many human facets, including sexuality (Hanna, 2010). Comparative studies across taxa suggest that females select mates by evaluating male motor performance, along with conspicuous male ornaments (Byers, Hebets, & Podos, 2010). Such elaborate displays are metabolically challenging and, therefore, provide honest signals of male vigour (i.e., the performance intensity of activities that require considerable energetic investment). There is substantial

evidence from diverse species of female preference for male vigour, including preferences for flight manoeuvre skills in birds, abdominal swaying speed in spiders, and displays of energetic behaviors that require agility and speed in mammals (Byers et al., 2010).

Given the relative infrequency of male ornaments in mammals, selection may have favored traits as quality indicators to prospective mates, and humans are no exception in this regard. Women are attentive to variation in dance movements of (non-professional) male dancers and judge physically strong dancers to be more attractive (Weege, Pham, Shackelford, & Fink, 2015). These assessments were made in the absence of additional information, such as personal identity, face/body morphology, or rhythmic ability. Thus, male physical strength is conveyed through dance movements. As predicted by Sexual Strategies Theory (Buss & Schmitt, 1993), women report a preference for men who display dance movements that signal phenotypic and genotypic quality. Men and women can accurately assess male physical strength from multiple cues, including face and body morphology (Sell, Hone, & Pound, 2012). Although there is corroborating evidence that such information is used in assessing the qualities of potential mating partners or competitors, the reliability of static cues as honest indicators of male physical strength is unclear. Cues to male vigour and strength, derived from body movement, may provide more reliable information about male quality than static physical features.

The complexity of movement captures myriad aspects of an organism's quality (Byers et al., 2010), including developmental history and current condition. This may be especially true in humans, where the neural structures required for the production and control of appealing body movements may be more complex than in any other species. There is no doubt that for learning of specific dance routines (e.g., in dance lessons), people with high imitative proficiency will perform better. We agree with Laland et al. (2016) that ritualized forms of dance may facilitate the formation of coalitions and signal social cohesion. However,

this situation may not accurately capture the evolution of dance as part of sexual selection, where movement quality may be more important than imitative proficiency.

In many social settings, people do not perform specific choreography, but dance “to their own beat.” Yet the variation observed in these movement patterns is sufficient to create selective preference in opposite-sex observers, with “good dancers” displaying high variability and amplitude in their moves, as reported in non-human animals (Neave, McCarty, Freynik, Caplan, Hönekopp, & Fink, 2011). Moreover, recent research reports that, as with dance, male physical strength is conveyed through gait and women have a preference for strong male walkers (Fink, André, Mines, Weege, Shackelford, & Butovskaya, *in press*). Gait does not require correspondence of visual/auditory input and motor output, yet women’s assessments of men’s dance and gait attractiveness correlate positively (Fink, Weege, Neave, Ried, & do Lago, 2014). Thus, we suggest that information about an individual’s condition is encoded in specific movement characteristics, such as speed, amplitude, and velocity. This information is likely used to form impressions about others in any kind of social setting, including the quality of potential mating partners.

We do not suggest that, in humans, courtship-related dance movements evolved before morphological traits. However, given the close link of motor performance with whole-organism performance (in terms of developmental history and current condition), we consider simultaneous evolution of static and dynamic traits plausible. In this view, movement information may have amplified quality cues of an individual, as reported in other species. From the perspective of the perceiver, attention to movement cues may have evolved because these cues are more difficult to fake than static features.

In conclusion, we propose that humans have evolved cognitive mechanisms for the assessment of social information from body movement, especially in courtship situations. These adaptations, together with language and music skills, may then have been used to share information beyond the mating context, thus facilitating ritualized forms of social exchange to

build coalitions and strengthen social cohesion through synchronous activity. Social bonding through dance thus could have evolved in consequence of the adaptive problem of identifying honest cues of quality from body movement.

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