

Samostatné přílohy

Publikované vědecké články související s diplomovou prací

V této příloze uvádím dva publikované články ve vědeckých časopisech, jejichž jsem spoluautorkou a jejichž výsledky jsou zčásti založeny na výzkumu, který jsem prováděla v rámci své diplomové práce.

1. Liu, Q., Ilčíková, T., Radchenko, M., Junková, M. & Špinka, M. 2023. Effects of reduced kinematic and social play experience on affective appraisal of human-rat play in Norway rats. *Frontiers in Zoology*, 20, 34.

Abstract. Background Play is a common and developmentally important behaviour in young mammals. Specifically in Norway rats (*Rattus norvegicus*), reduced opportunity to engage in rough-and-tumble (RT) play has been associated with impaired development in social competence. However, RT play is a complex behaviour having both a kinematic aspect (i.e., performing complex 3D manoeuvres during play fights) and a social aspect (interacting with a playful partner). There has been little research so far on disentangling the two aspects in RT play, especially on how these two aspects affect the affective appraisal of the intense physical contact during play. Results To examine the developmental effects of kinematic and social play reduction on affective appraisal in rats, we subjected male Long-Evans rats from 21 days old to RT play experience that was reduced either kinematically (through playing in a low ceiling environment) or socially (through playing with a less playful Fischer-344 rat). Starting at 35 days, we measured their production of positively (50-kHz) and negatively (22-kHz) valenced ultrasonic vocalisations (USVs) in a 2-min standardised human-rat play procedure that mimicked the playful sequences of nape contact, pinning, and belly stimulation („tickling“) for ten days. We hypothesised that the rats with kinematically or socially reduced play would perceive the ‘tickling’ less positively and thus emit positive ultrasonic vocalisations at lower rates compared to control rats with non-reduced play experience. Our results confirmed that each of the treatments reduced play differently: while the kinematic reduction abolished playful pinnings entirely, the social reduction decreased the pinnings and made play highly asymmetric. During the tickling procedure, rats mostly produced 50 kHz USV, indicating that they appraised the procedure as positive. There was a wide inter individual variance and high individual consistency in rats’ USV responses to ‘tickling’. Crucially, neither the kinematically nor the socially reduced play experience affected either type of USV production when rats were ‘tickled’. Conclusions This finding indicates that the ability to appraise play-like interactions as positive remains unaffected even when the kinematic or the social aspect of play experience was substantially curtailed.

2. Liu, Q., Radchenko, M. & Špinka, M. 2024 in press. Disentangling developmental effects of play aspects in rat rough-and-tumble play. *Biology Letters*.

Abstract. Animal play encompasses a variety of aspects, with kinematic and social aspects being particularly prevalent in mammalian play behaviour. While the developmental effects of play have been increasingly documented in recent decades,

understanding the specific contributions of different play aspects remains crucial to understand the function and evolutionary benefit of animal play. In our study, developing male rats were exposed to rough-and-tumble (RT) play selectively reduced in either the kinematic or the social aspect. We then assessed the developmental effects of reduced play on their appraisal of standardised human-rat play („tickling“) by examining their emission of 50 kHz ultrasonic vocalisations (USVs). Using a deep learning framework, we efficiently classified five subtypes of these USV across six behaviour states. Our results revealed that rats lacking the kinematic aspect in play emitted fewer USVs during tactile contacts by human and generally produced fewer USVs of positive valence compared to control rats. Rats lacking the social aspect did not differ from the control and the kinematically reduced group. These results indicate aspects of play have different developmental effects, underscoring the need for researchers to further disentangle how each aspect affects animals.