



Free-choice exploration in laboratory zebrafish

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Introduction



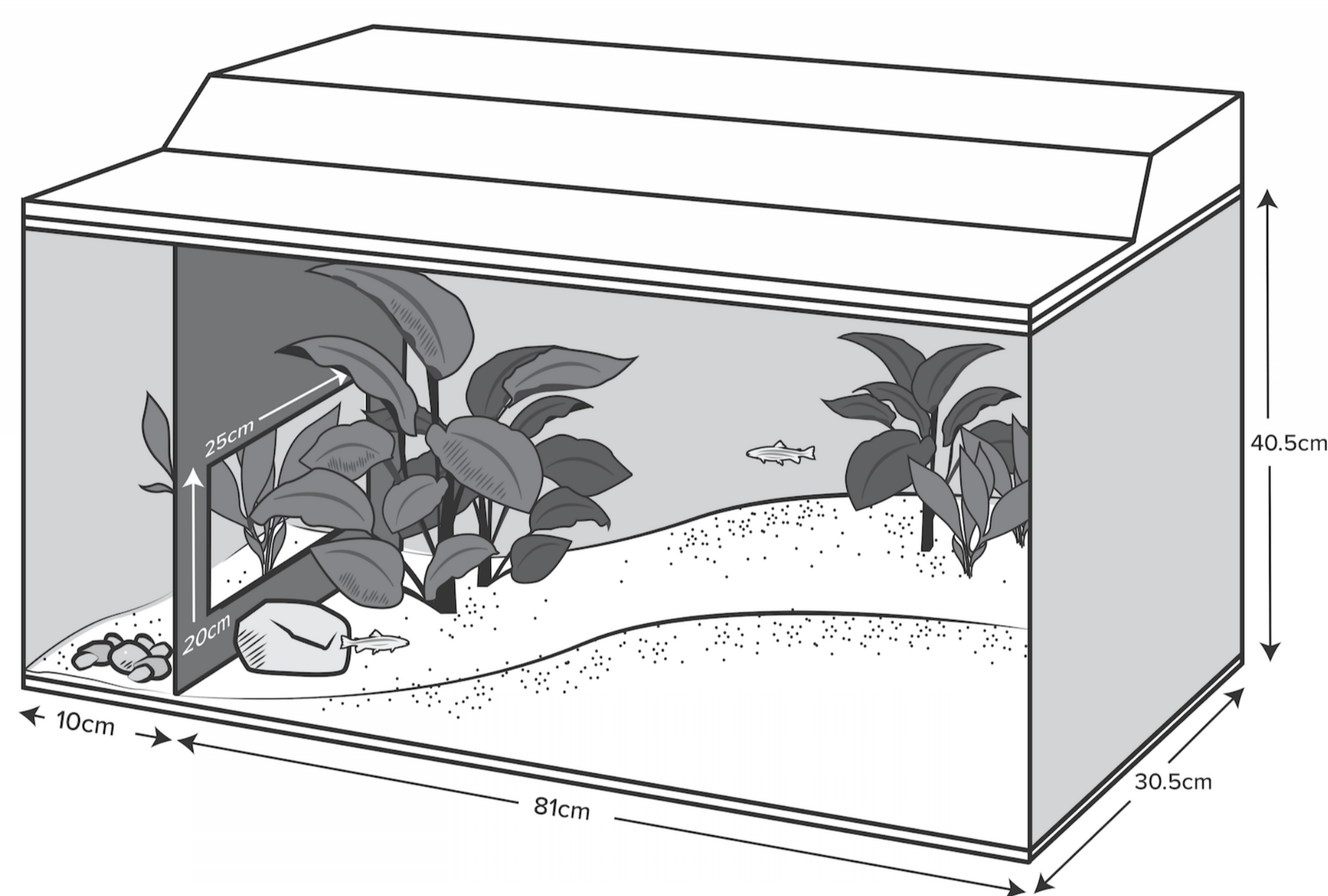
Wild zebrafish habitat

Cognitive stimulation is rewarding¹ and capable of eliciting positive emotions in several species.^{2,3} In contrast to the abundant learning and exploration opportunities available in nature, captive environments can be under-stimulating. Zebrafish are now a popular scientific model, yet little is known about their response to opportunities to explore. **The aim of this study was to measure behavioural responses of laboratory zebrafish to the opportunity to freely explore novel space.**



Standard laboratory tanks

Methods



10 fish/110 L tank; n=6

After living for nine months within large semi-natural home tanks, we removed a divider to expose 10 cm of additional novel space. We observed behaviour on four days: the day before (baseline), the day of, the day after, and two weeks after dividers were removed.

Behaviours measured:

- free-choice exploration (latency, number of inspections)
- anxiety (bottom-dwelling)
- social behaviour (agonistic behaviour, cohesion, coordination)

Results

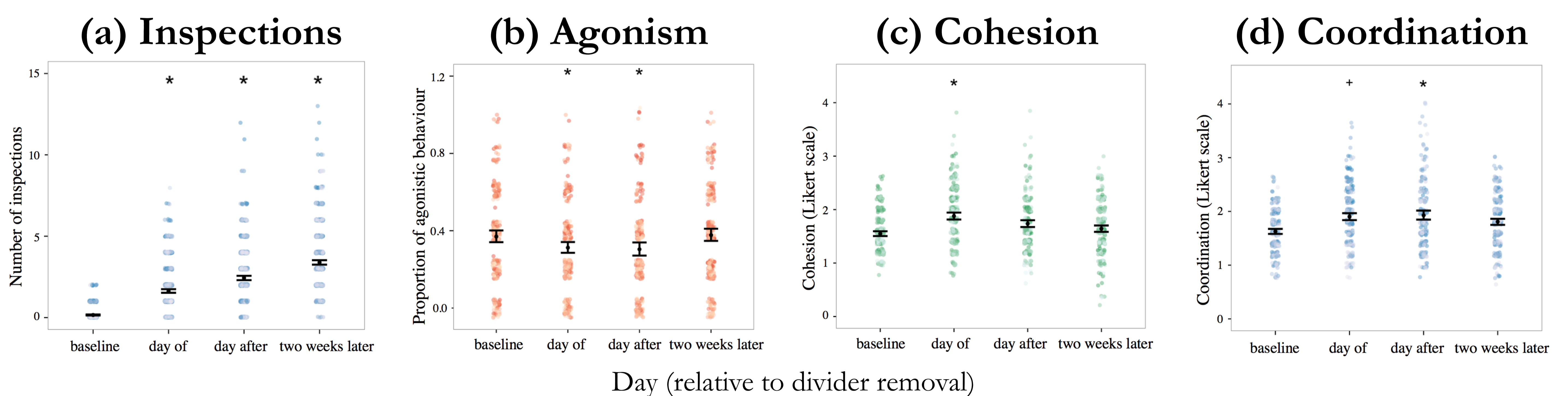


Figure 1. (a) Fish inspections of the novel area **increased** over all days ($p < 0.003$); (b) Agonistic behaviour was **reduced** on the day of and day after ($p = 0.02$); (c) Group cohesion was **greater** on the day of ($p = 0.04$); and (d) Group coordination was **greater** on the day after ($p = 0.04$; day of $p = 0.06$).

When provided the opportunity, zebrafish readily engaged in free-choice exploration—the **average latency** to start exploring was 9.7 ± 7.6 SD seconds. Having the opportunity to explore did not induce anxiety behaviour ($p > 0.73$), but it did alter social behaviour by reducing agonistic behaviour and increasing both group cohesion and coordination.

Conclusion

Given that their wild habitats offer many such exploration opportunities, having the chance to freely explore in captivity may benefit laboratory zebrafish by promoting positive emotional states.