

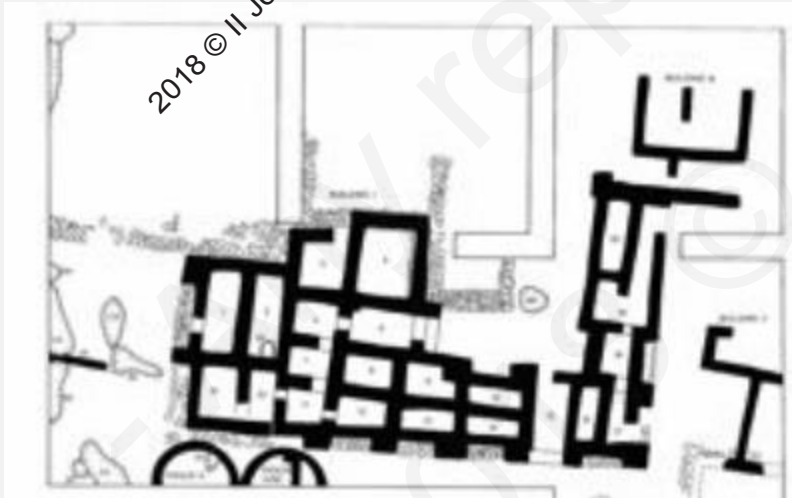
From disorganized equality to efficient despotism:

How demographic increase and cost of organisation lead to the evolution of hierarchy in human societies

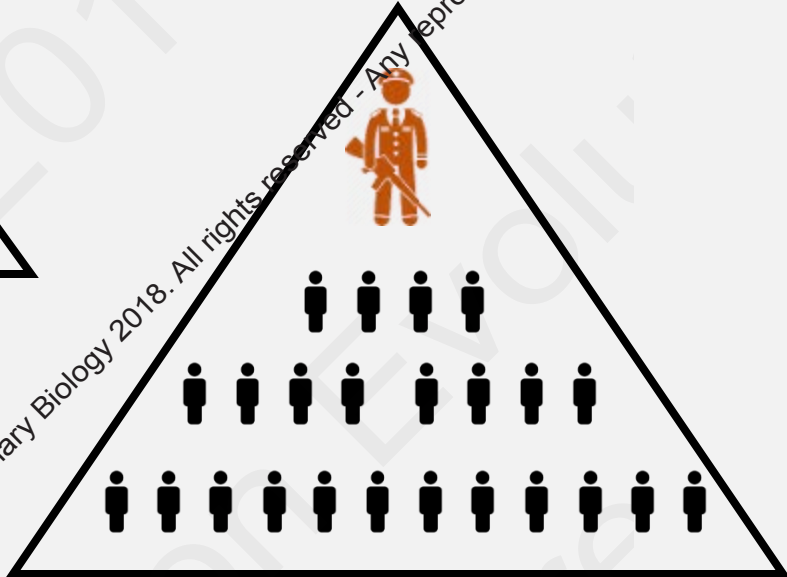
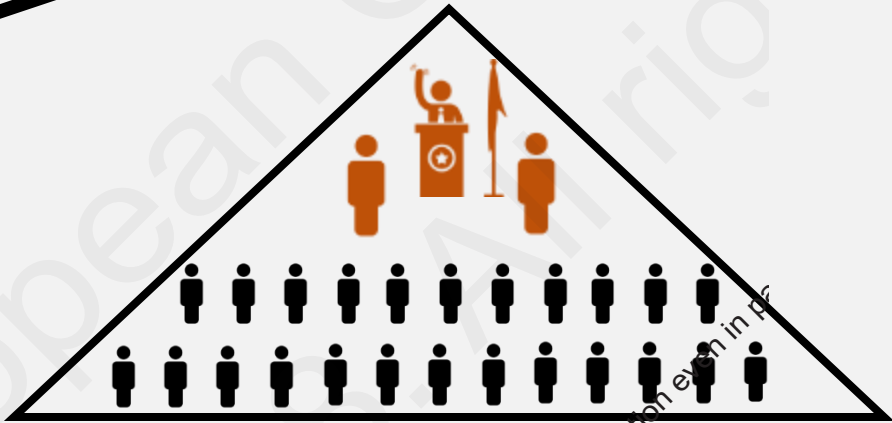
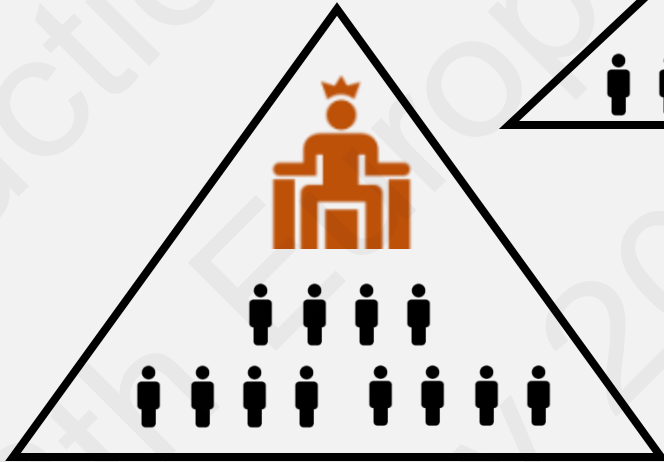
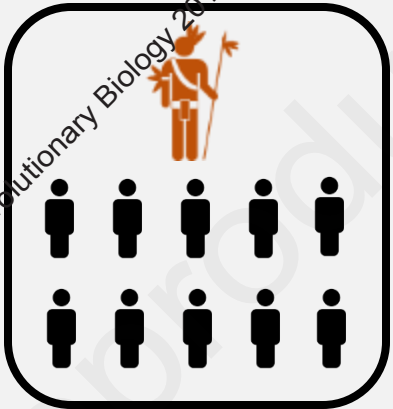
Cedric Perret , Simon Powers, Emma Hart



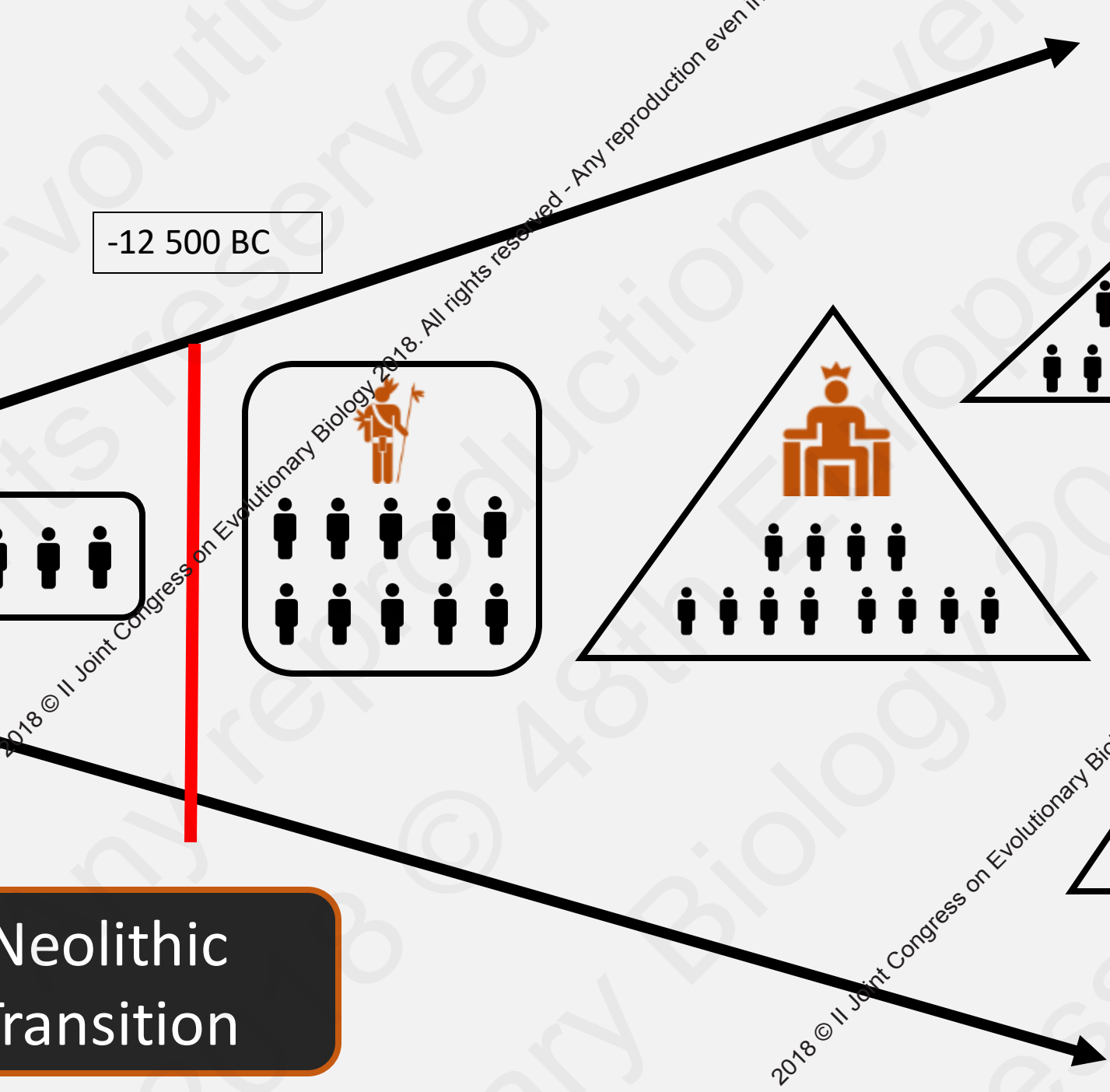
Neolithic Transition



-12 500 BC

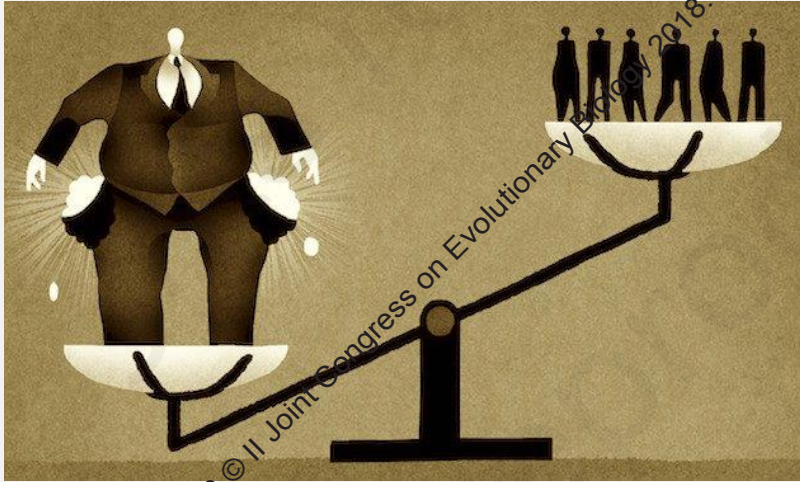


Neolithic
Transition



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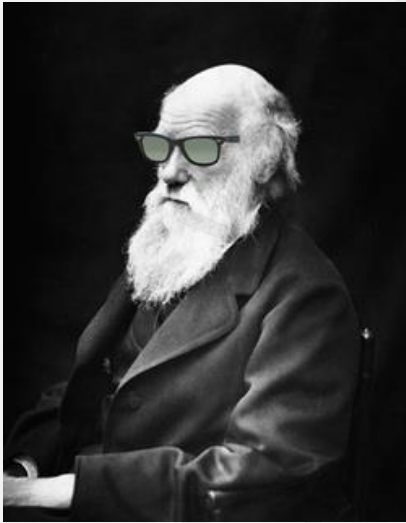
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Why do individuals accept to be exploited followers?

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Hierarchy has evolved (Van vugt, 2011)

- Biological and cultural evolution
- Numerous independent evolution
- Heritable:
 - Biological characteristics (Judge et al, 2002)
 - Social position (Dal b3 et al, 2009)

Table 6
Regression of Leadership on Big Five Traits

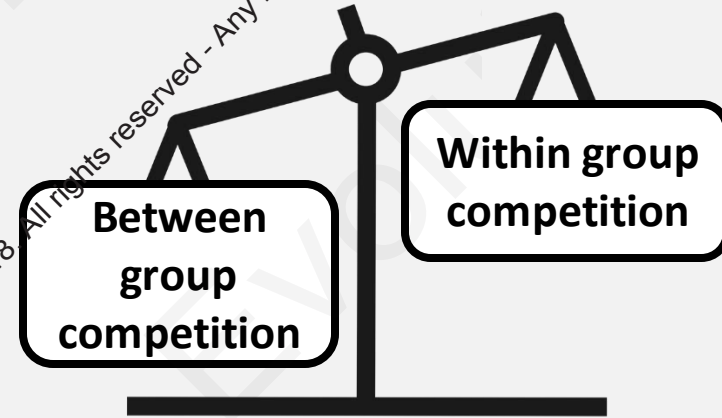
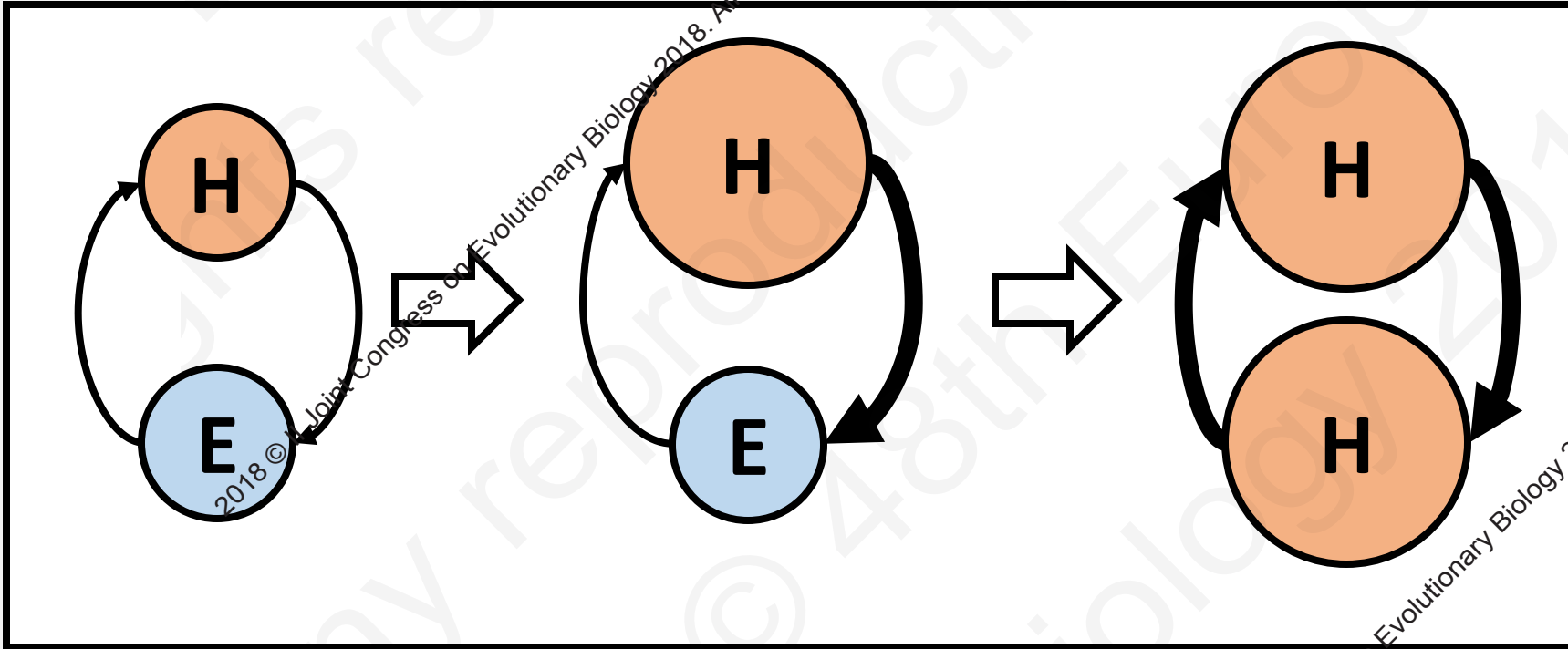
Trait	Leadership emergence		Leadership effectiveness	
	<i>r</i>	<i>r</i>	<i>r</i>	<i>r</i>
Neuroticism	-1.67		-1.04	
Extraversion	5.90*		2.00*	
Openness	4.06*		2.10*	
Agreeableness	-2.66*		1.07	
Conscientiousness	6.88*		1.26	
Multiple <i>R</i>	10.86*		4.55*	

(Judge et al, 2002)

“Evaluations of beauty explain success in real elections better than evaluations of competence, intelligence, likability, or trustworthiness.” (Poutvaara et al, 2006)

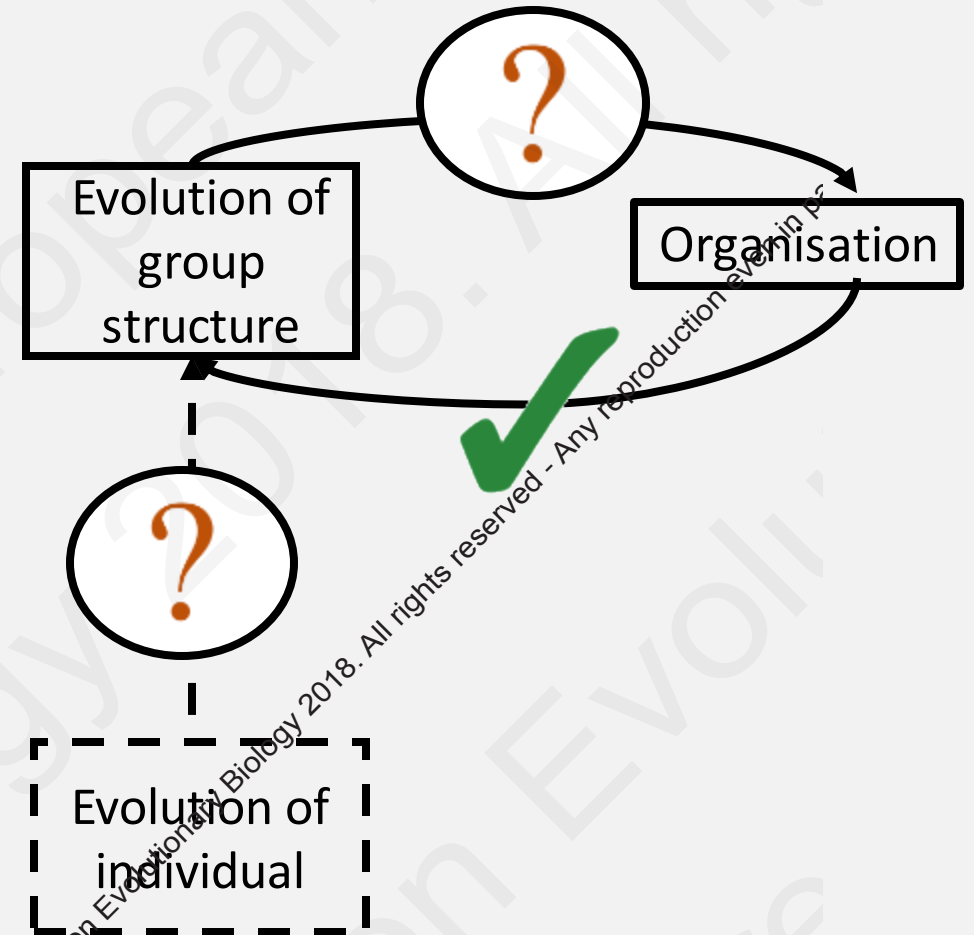
Functional theories: Hierarchy is an adaptation

Wittfogel, 1975
Calvert, 1992
Van Vugt, 2011



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Previous works



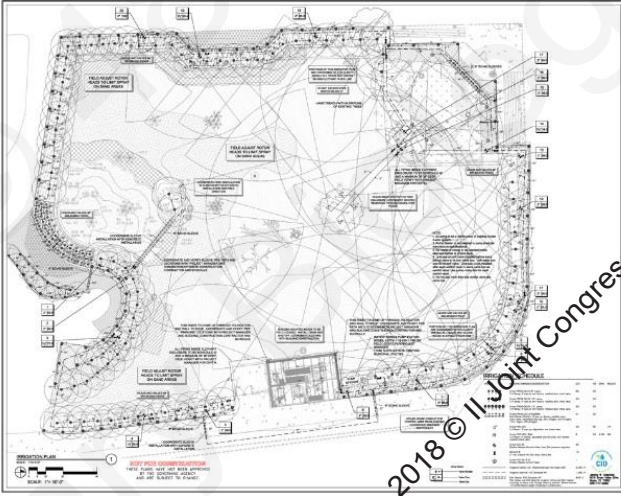
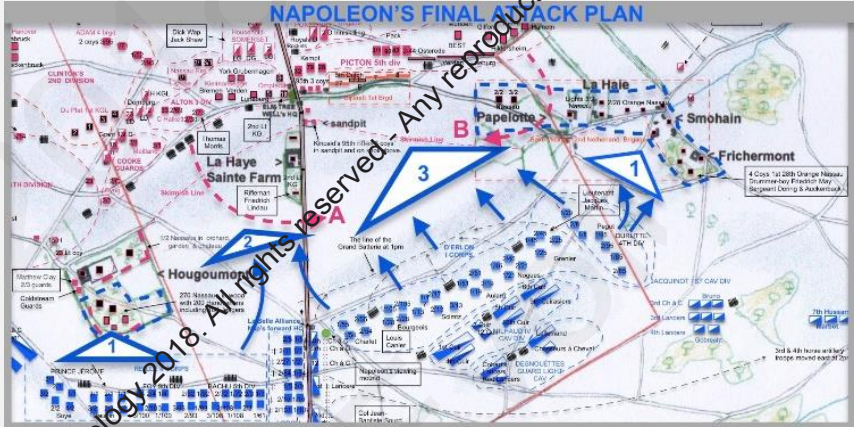
*Makowsky et al,
2016
Gavrilets et al, 2014*

Collective action



Cooperation problems

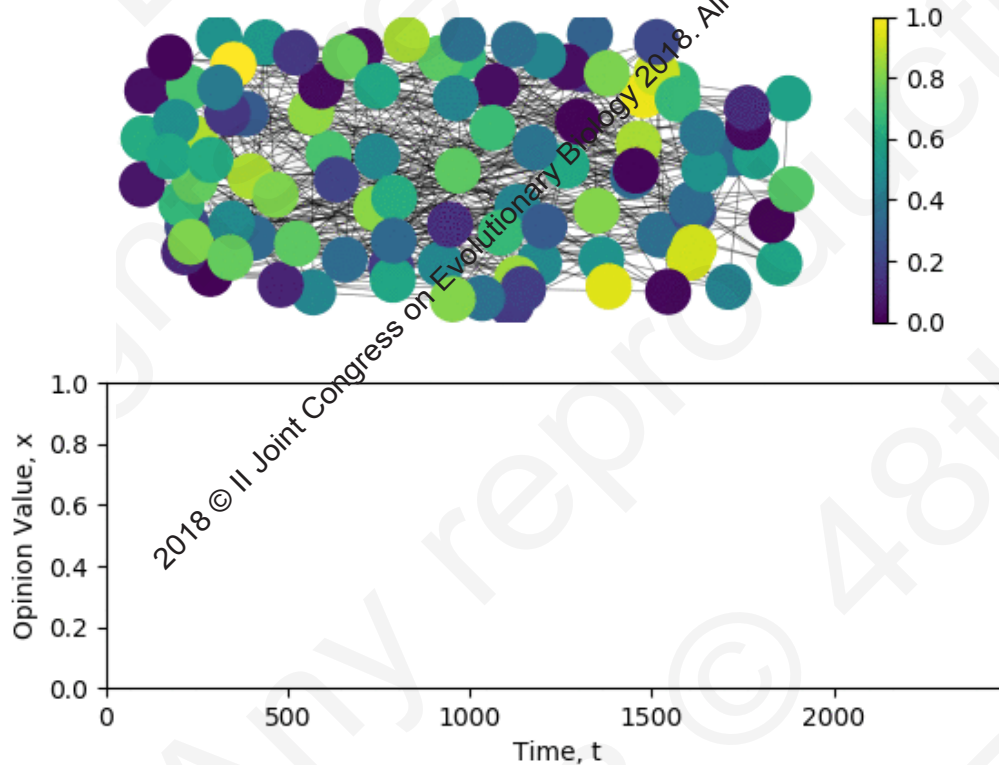
Coordination problems



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Collective decision-making



SCIENTIFIC REPORTS

OPEN

Convergence to consensus in heterogeneous groups and the emergence of informal leadership

Received: 27 January 2016

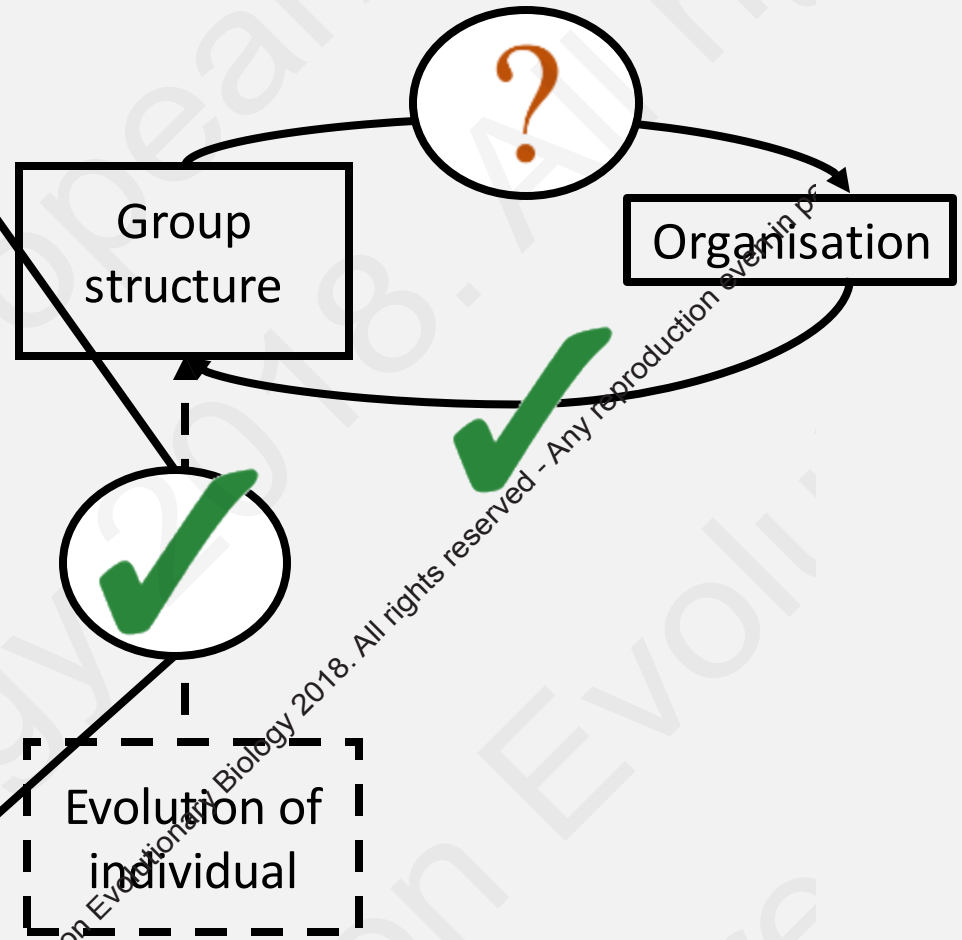
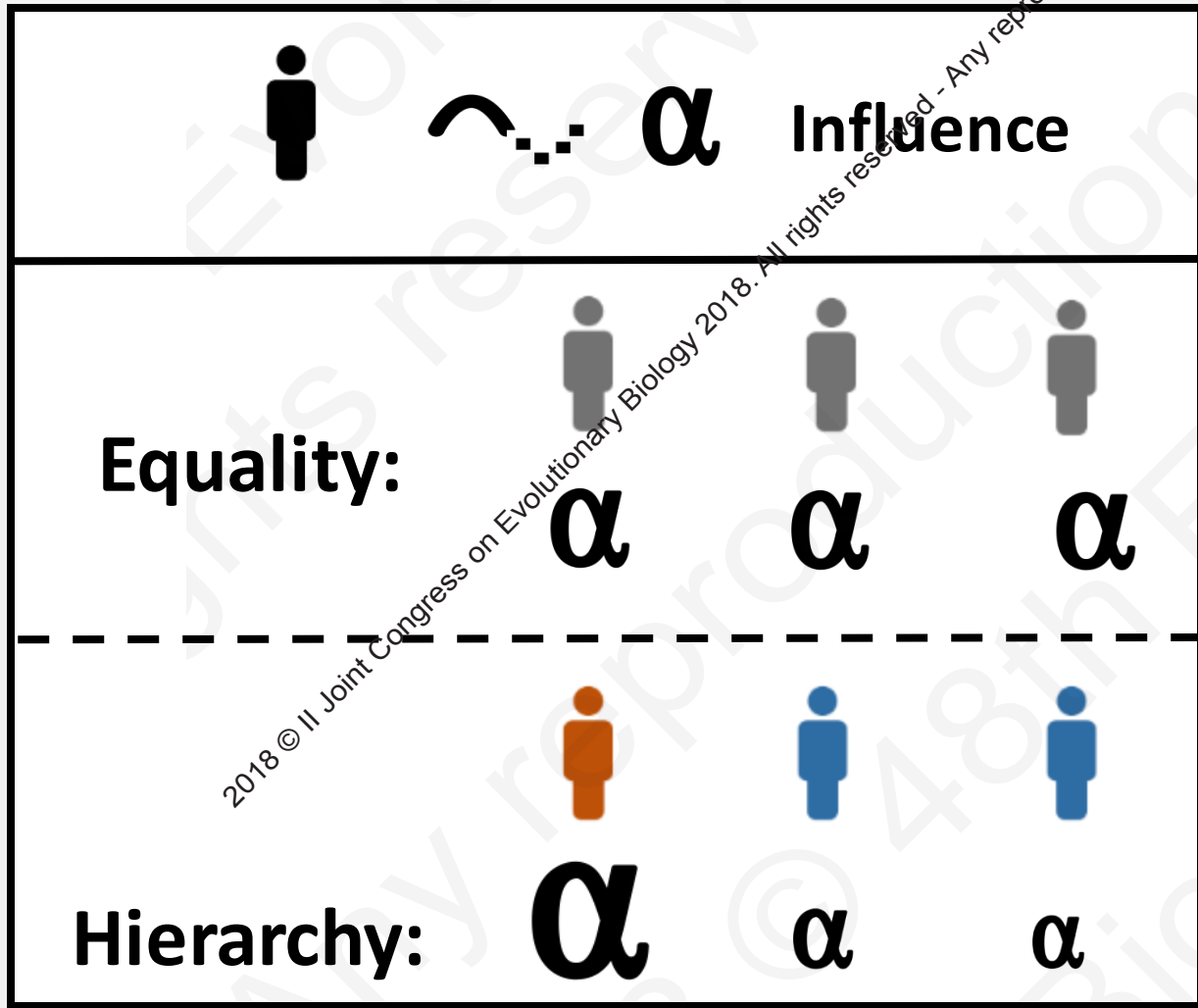
Accepted: 21 June 2016

Published: 14 July 2016

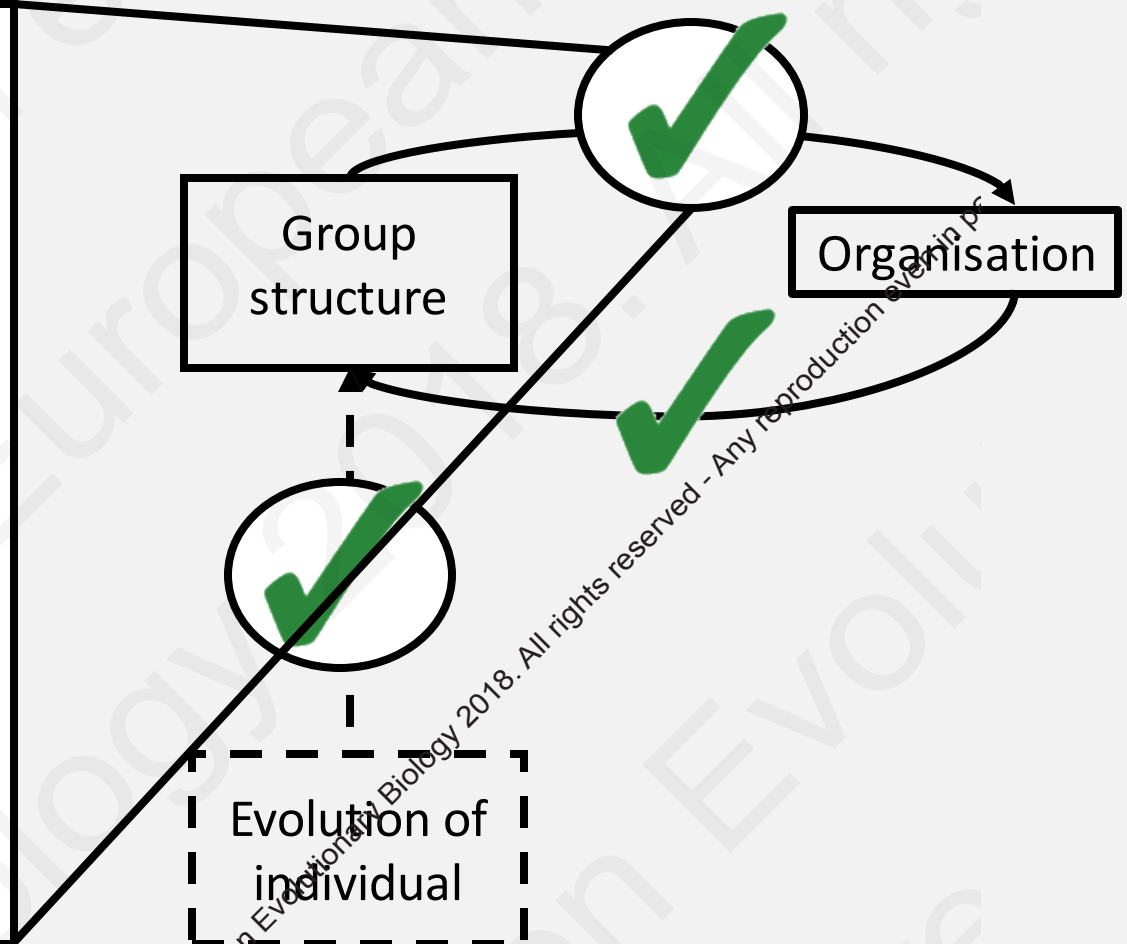
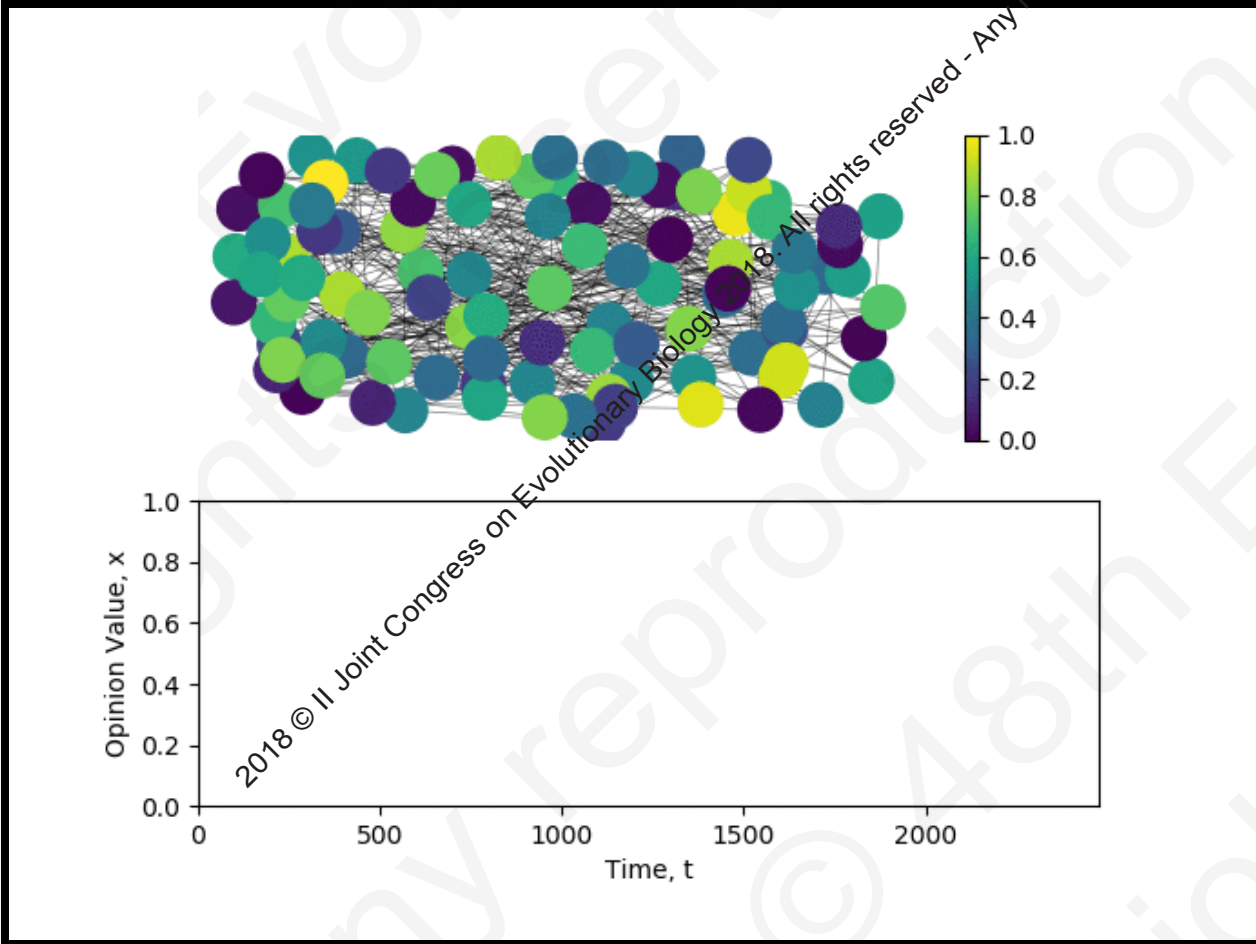
Sergey Gavrilets^{1,2,3}, Jeremy Auerbach² & Mark van Vugt⁴

When group cohesion is essential, groups must have efficient strategies in place for consensus decision-making. Recent theoretical work suggests that shared decision-making is often the most efficient way for dealing with both information uncertainty and individual variation in preferences. However, some animal and most human groups make collective decisions through particular individuals, leaders, that have a disproportionate influence on group decision-making. To address this discrepancy between theory and data, we study a simple, but general, model that explicitly focuses on the dynamics of

Few influential individuals reduce the time to reach consensus

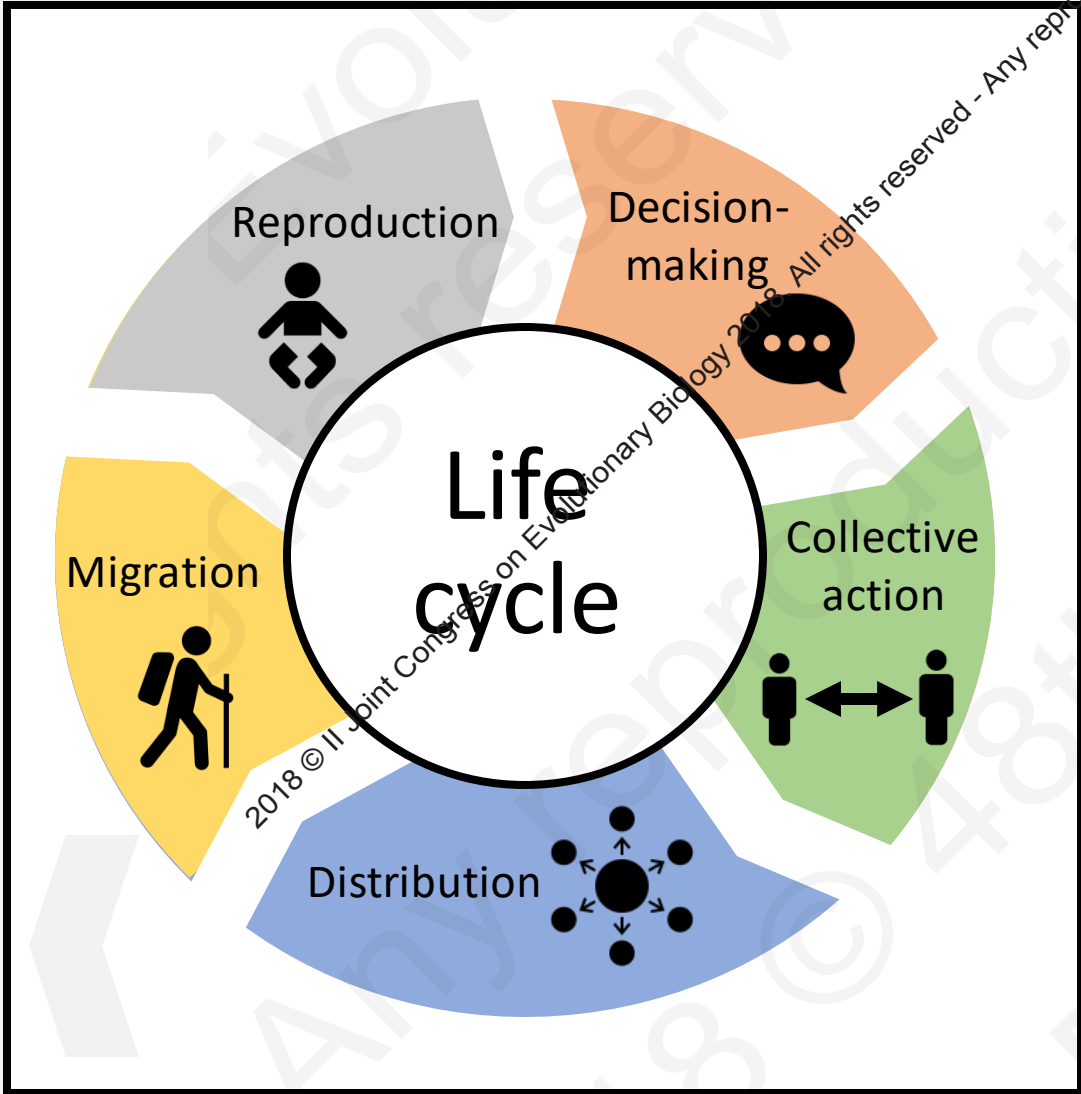


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Does the evolution of individual influence lead to the emergence of hierarchy?

Fitness equation



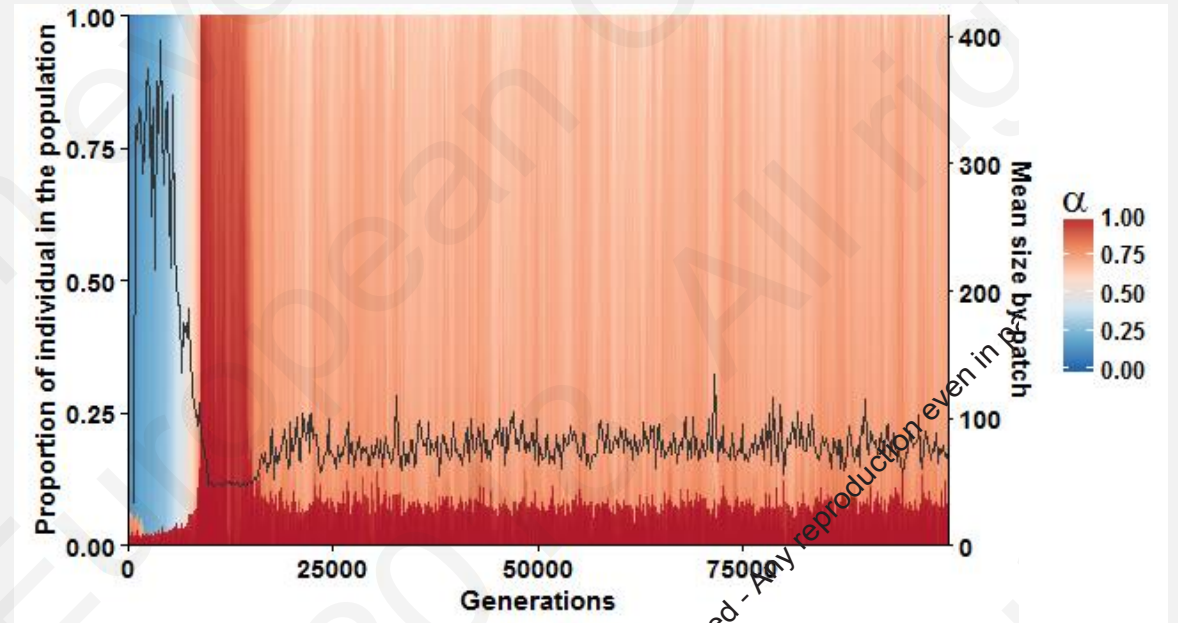
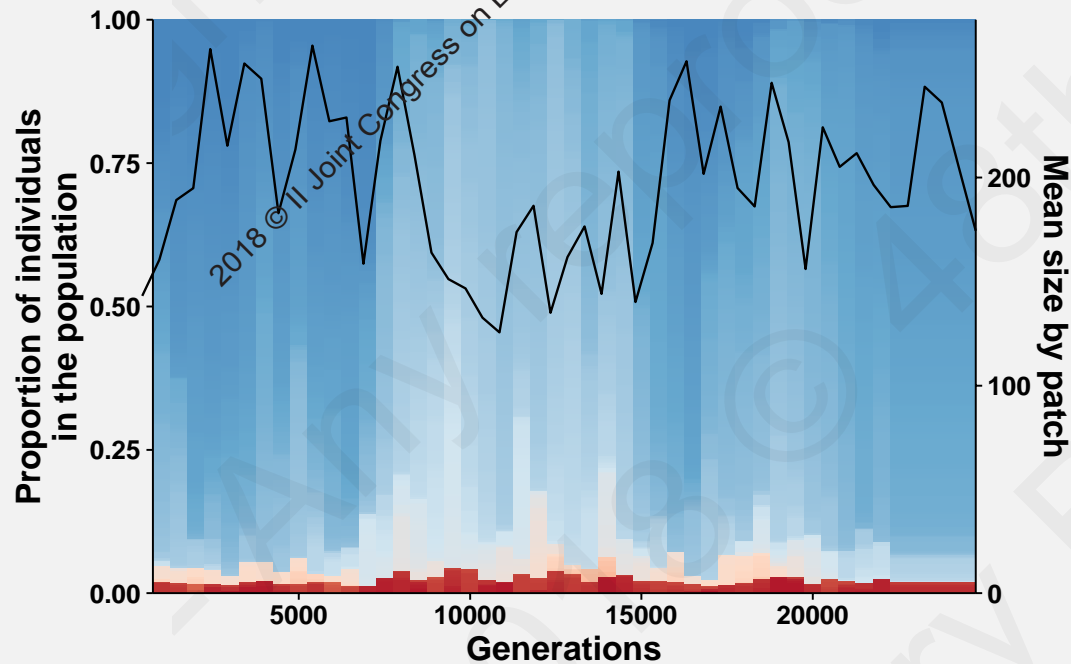
$$W = \underbrace{\frac{r}{1 + \frac{N}{K}}}_{\text{Intrinsic growth rate}} + \underbrace{(p * f(N) - \text{CO})}_{\text{Additional benefit received}}$$

The equation is annotated with brackets and labels:

- The term $\frac{r}{1 + \frac{N}{K}}$ is bracketed and labeled "Intrinsic growth rate".
- The term $(p * f(N) - \text{CO})$ is bracketed and labeled "Additional benefit received".
- Inside the second bracket, $p * f(N)$ is bracketed and labeled "Additional benefit".
- Inside the second bracket, CO is bracketed and labeled "Cost of organization".

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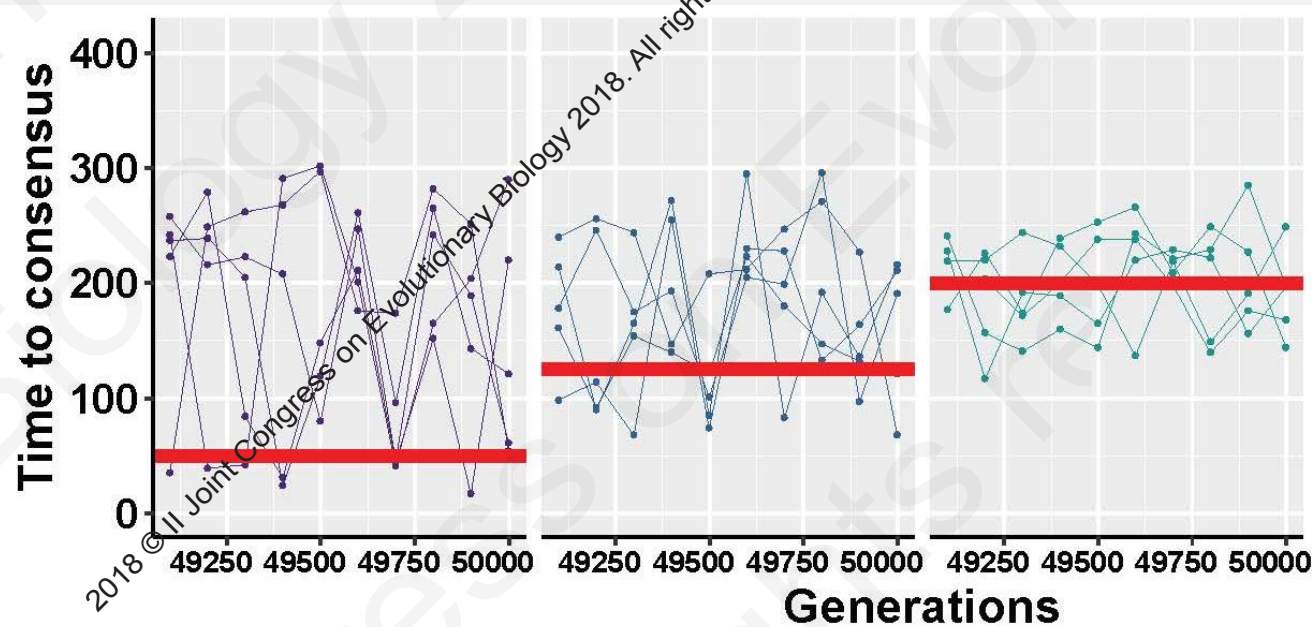
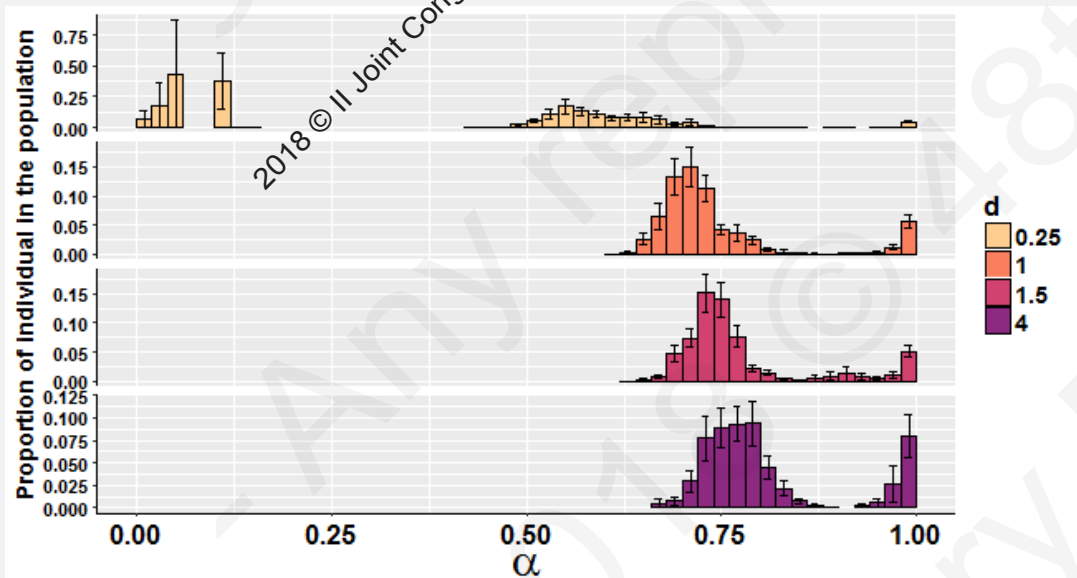
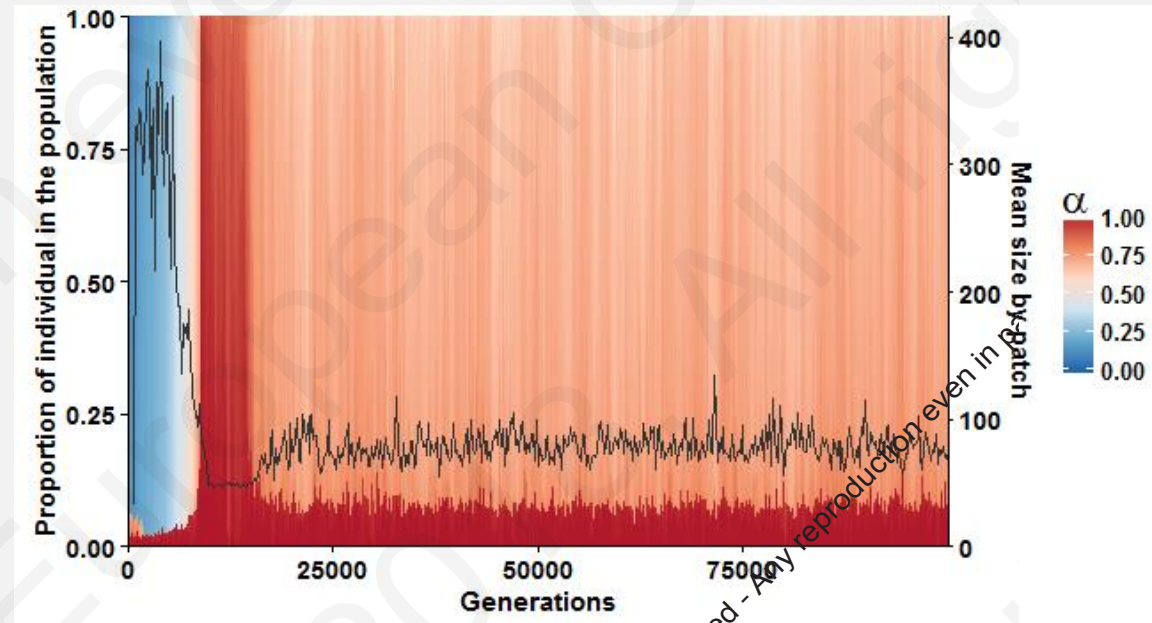
When the task is costly to organise e.g. war

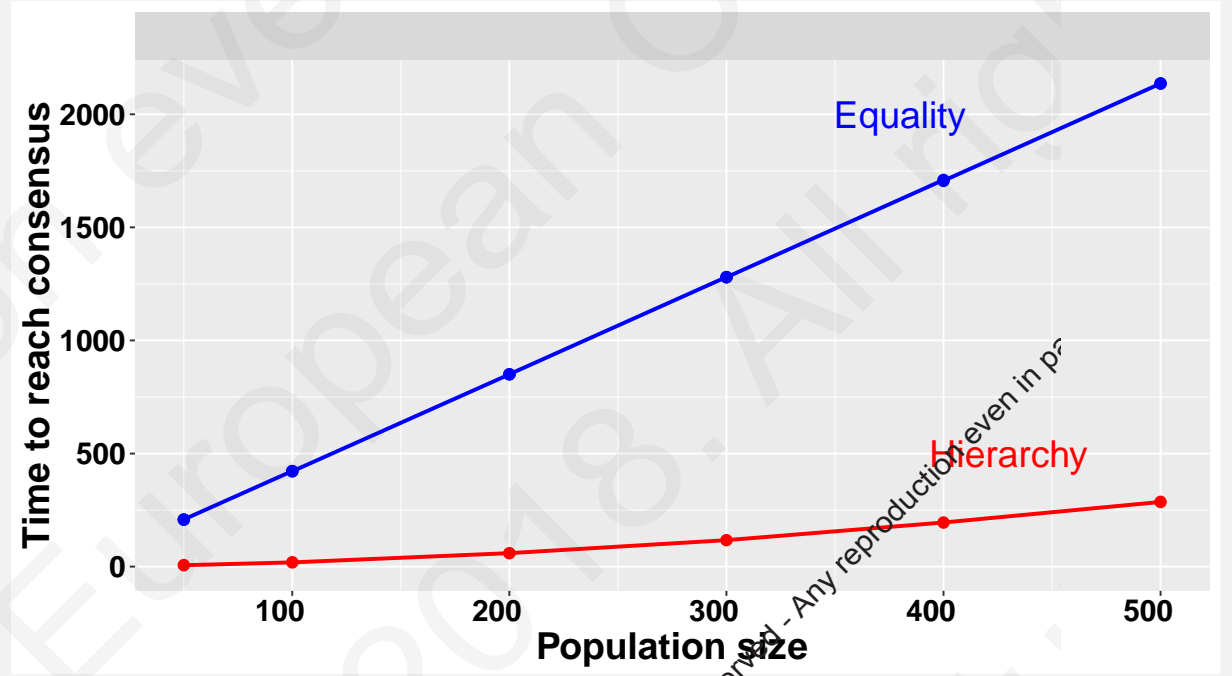
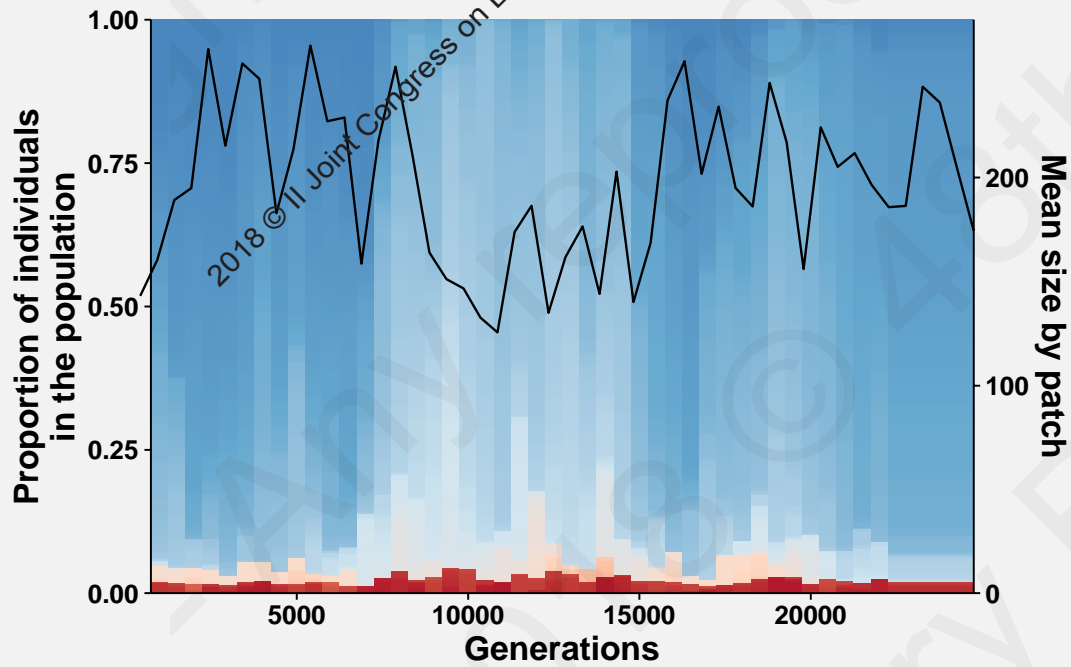


When the cost of the task scale with size

When the task is costly to organise e.g. war

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When the cost of the task scale with size

Conclusion

- Collective decision-making provides a mechanistic explanation of hierarchy benefit
- Hierarchy can emerge from the evolution of individual (influence)
- Two mechanisms (two predictions):
 - When task is costly
 - When cost of organising task scales with size

Further work

- Test the predictions of the model
- Transition from inequality of influence to inequality of resources
- Use collective-decision making to explore further the interaction between social organisation and other processes
 - Do social organisation affects cultural evolution?
 - Do social organisation affects the evolution of institutions ?



Thank you for your attention



Simon
Powers



Emma
Hart

Poster session advertising

P-1206 (level 3) From disorganized equality to efficient despotism: How demographic increase and cost of organization lead to the evolution of hierarchy in human societies

P-1209 (level 3) Claire Guerin: The building of states: how sustainable elite class and institutions can evolve from chiefdom

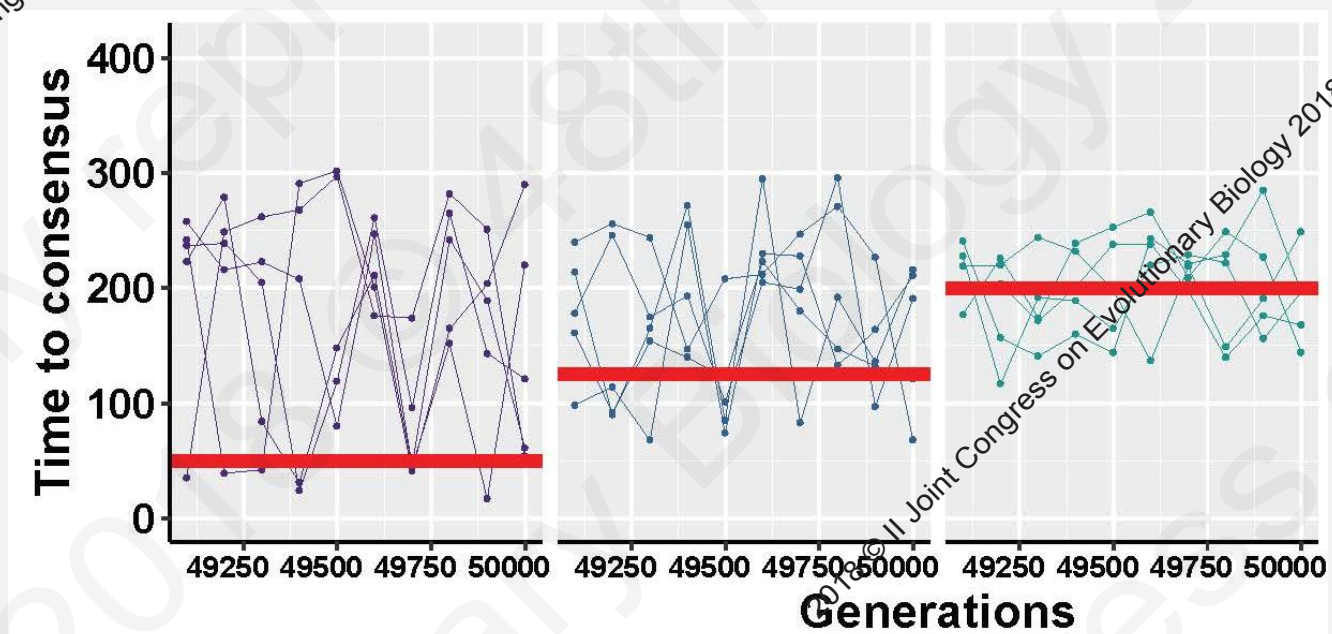
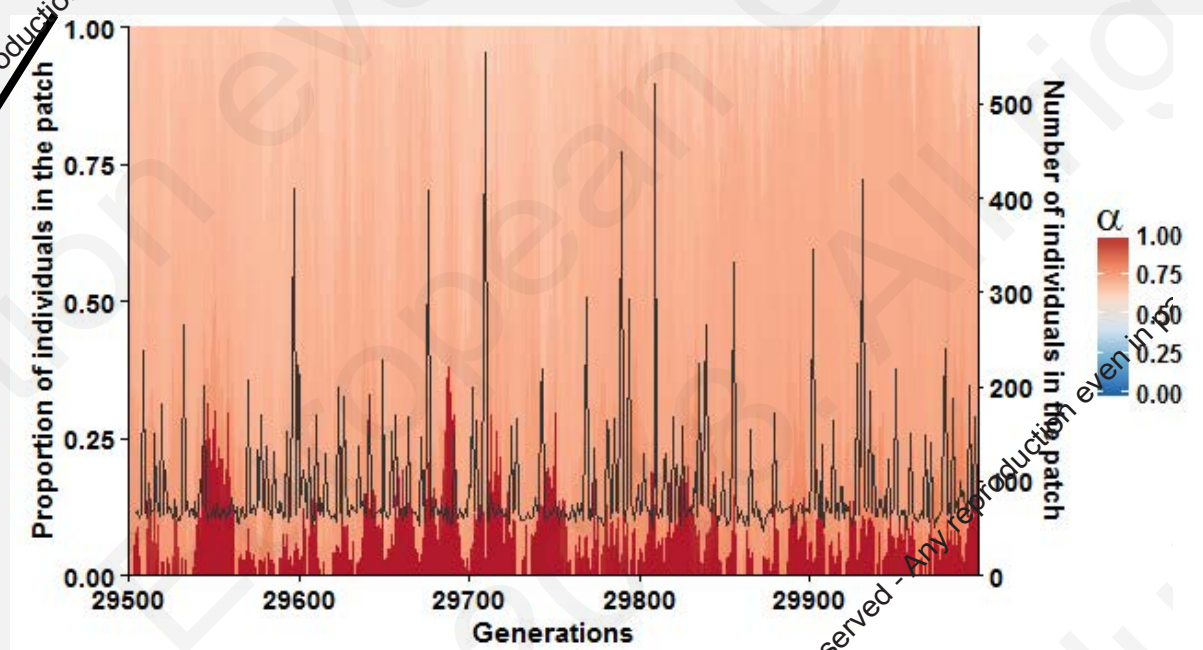
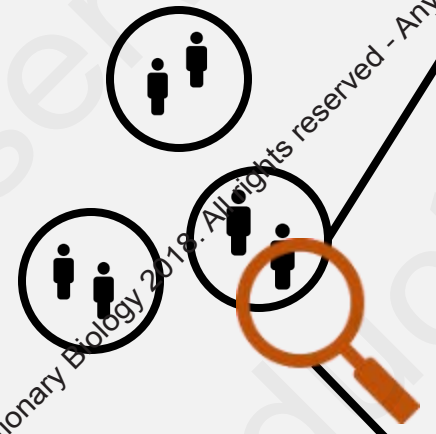


C.perret@napier.ac.uk



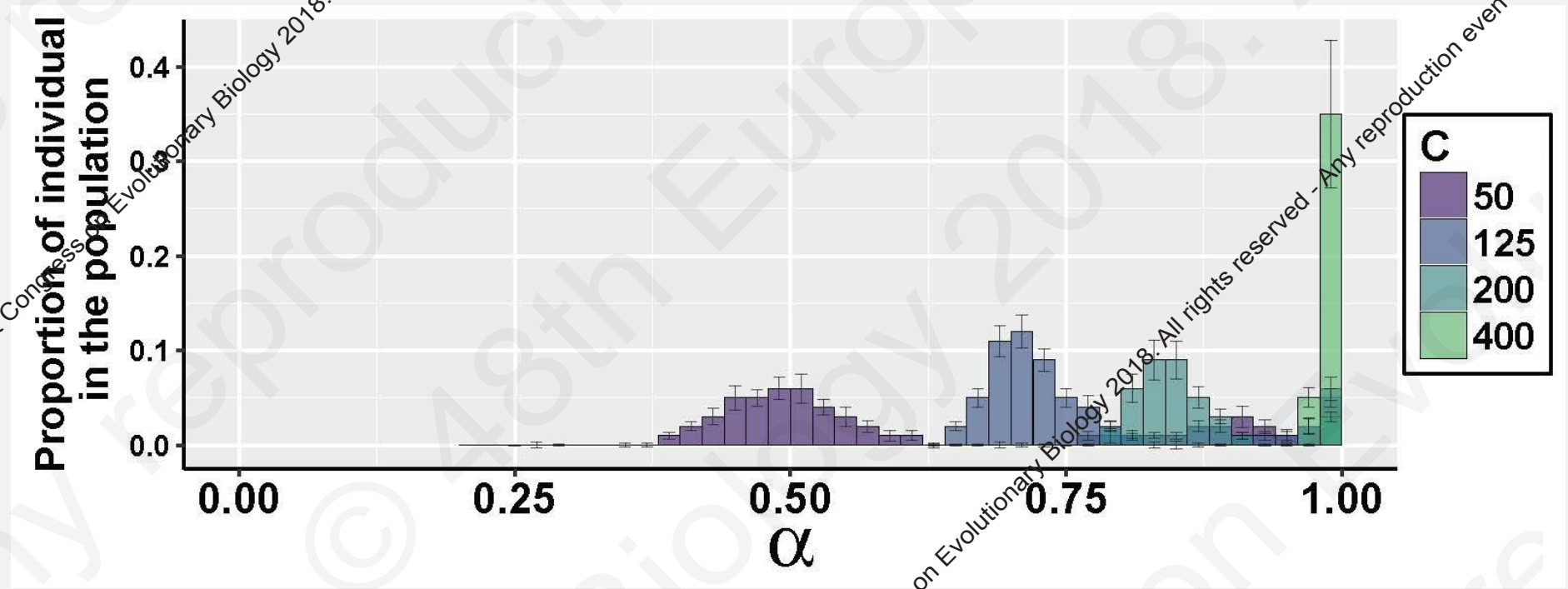
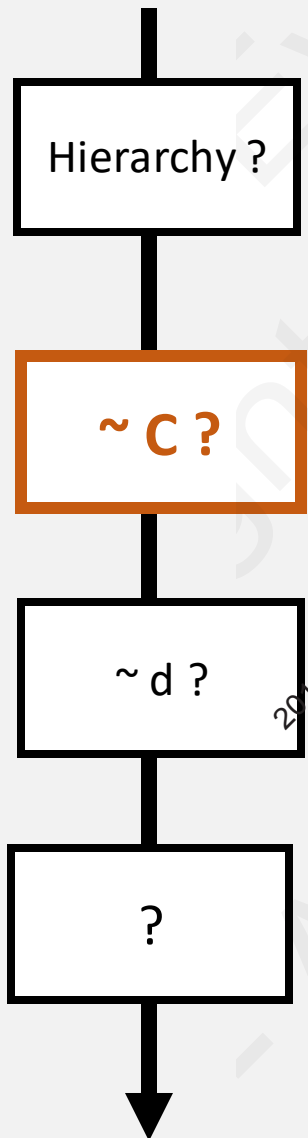
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Higher cost of decision-making favors the evolution of leadership



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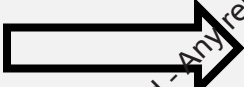
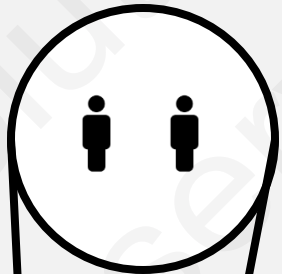
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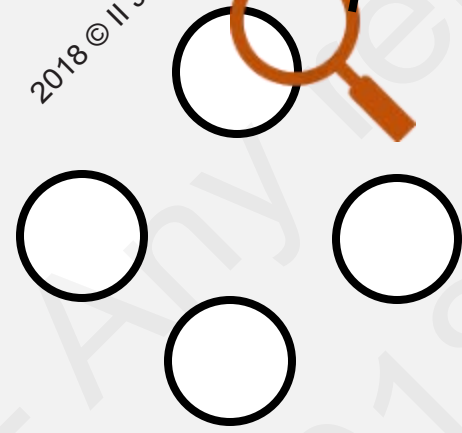
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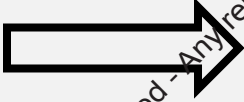
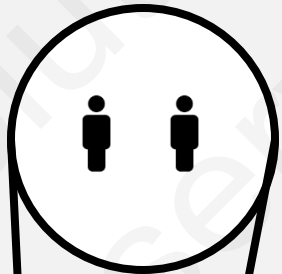


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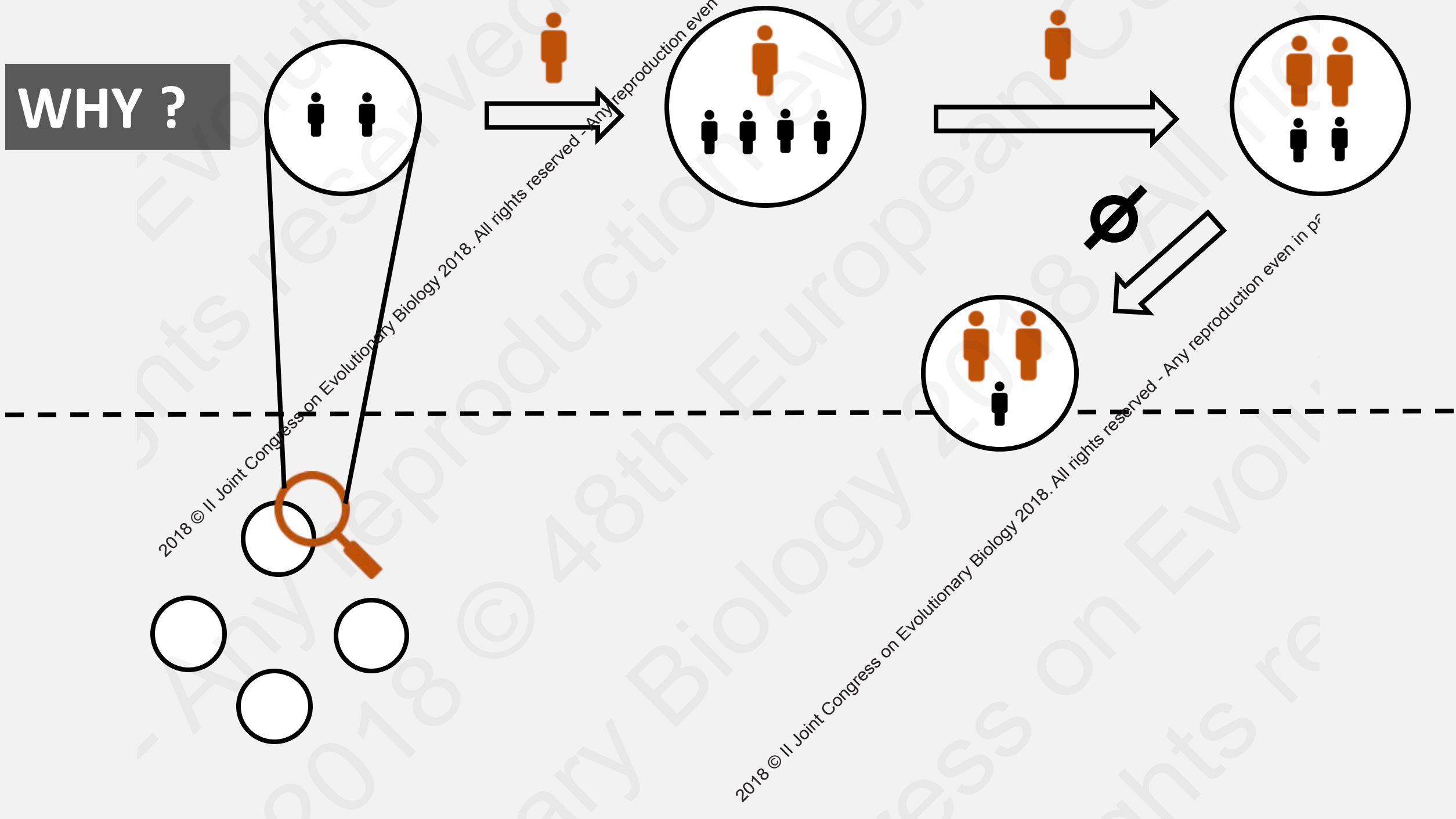
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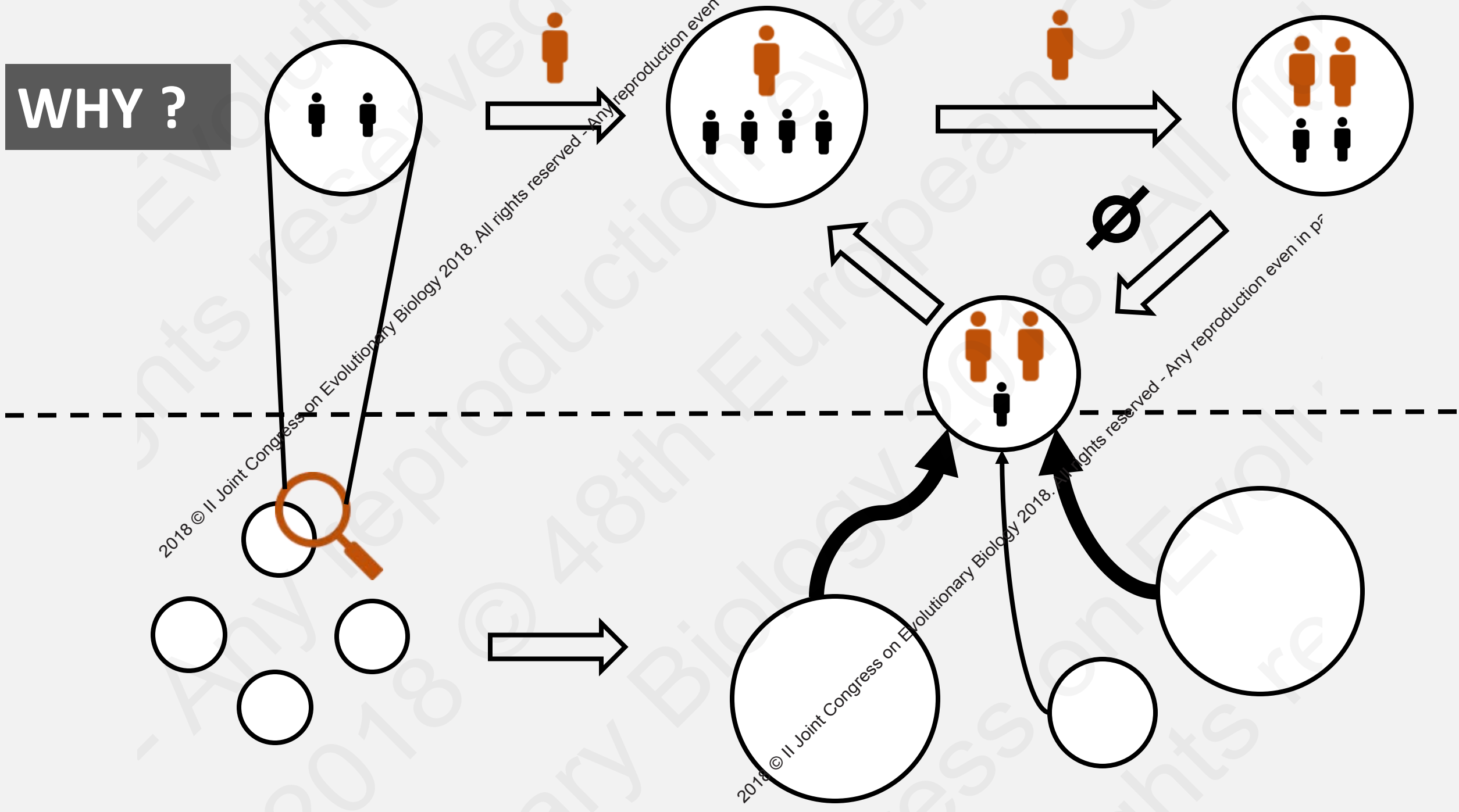
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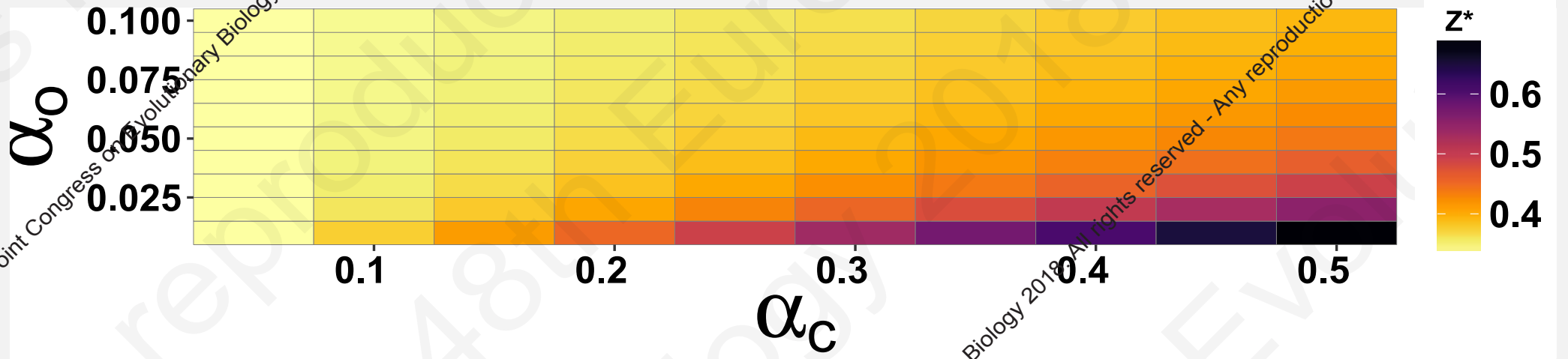
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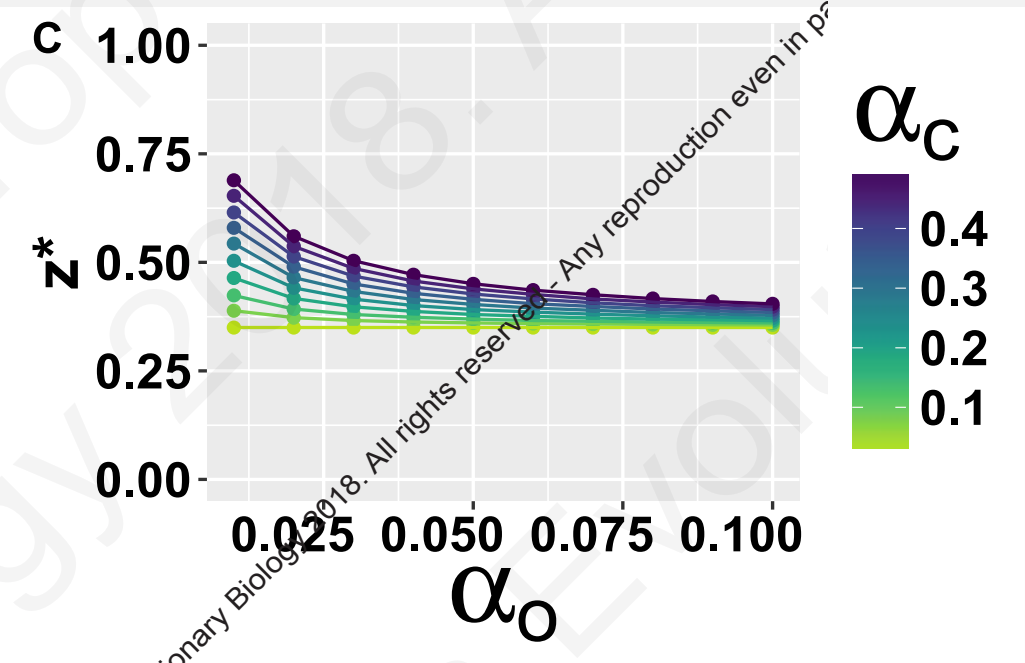
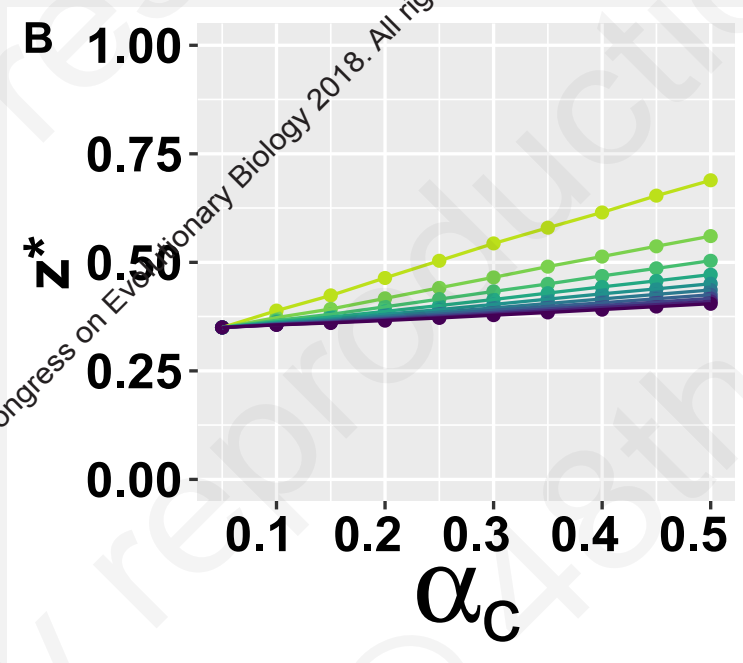
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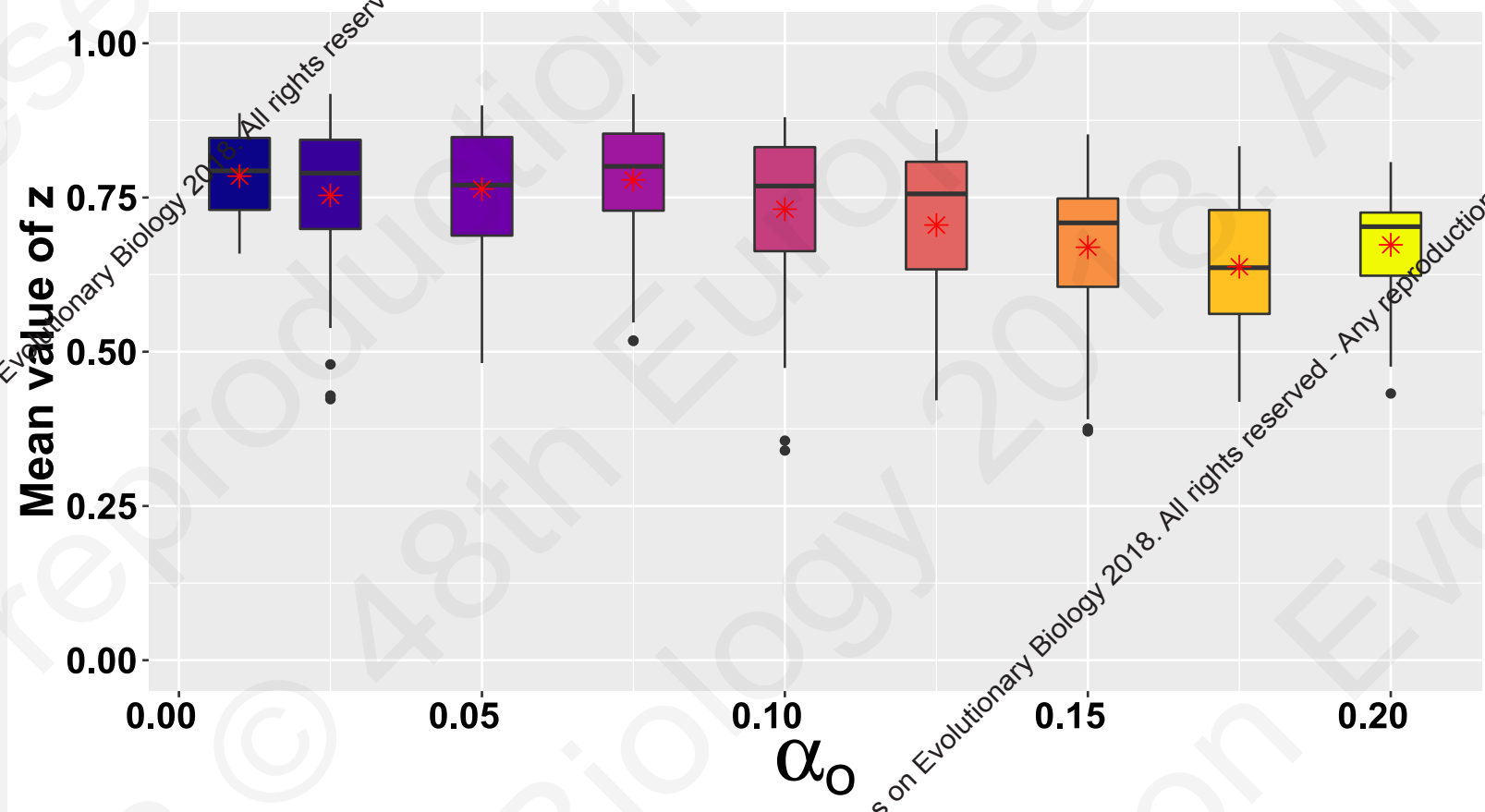
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