

Desert Ant Adaptive Navigation

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Ants in the Pants

Florian Hasler, Matthias Heinzmann, Andreas Urech, Dominik
Werner



What is it all about?



Figure : *Cataglyphis fortis* ¹

¹<http://www.lambrinos.ch> December 5th 2015



What is it all about?

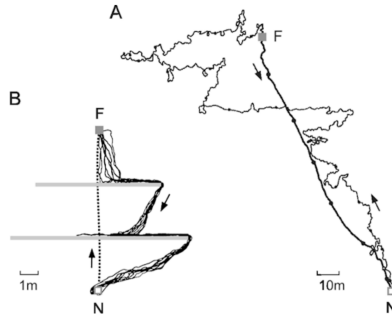


Figure : Foraging walks Wehner2003



What is it all about?

- one ant, one prey → no further communication needed

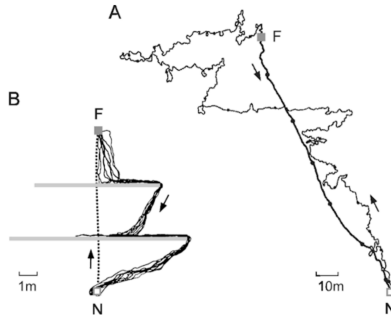


Figure : Foraging walks Wehner2003

What is it all about?

- one ant, one prey → no further communication needed
- Why is time, hence the shortest way back so crucial?

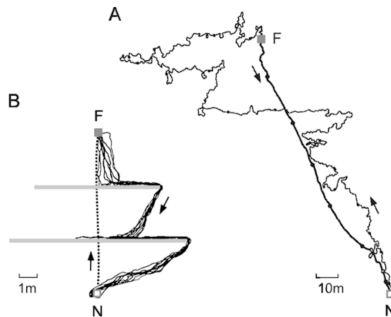


Figure : Foraging walks Wehner2003

What is it all about?

- one ant, one prey → no further communication needed
- Why is time, hence the shortest way back so crucial?
- Distances in relation to ant's size.

Speed of *cataglyphis fortis* $\approx 1 \frac{m}{s}$

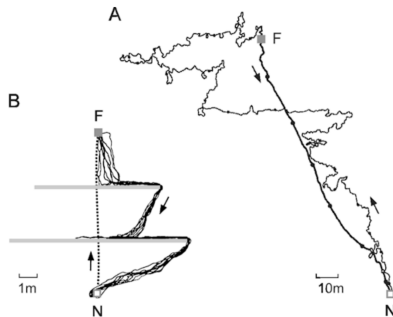


Figure : Foraging walks Wehner2003



How do they do it?

- Pathintegration



How do they do it?

- Pathintegration and
- Local Orientation

How do they do it?

Algorithm ReturnToMyNest()

```
while not at nest do  
    execute global vector;  
    update global vector;  
    if local vector recognised then  
        while local vector > 0 do  
            execute local vector;  
            update local vector;  
            update global vector;  
        end  
    end  
end  
return
```

Algorithm 1: Returning to the nest

Pathintegrator-model ¹

$$\varphi(n+1) = \varphi(n) + k \cdot \frac{(\pi + \delta) \cdot (\pi - \delta) \dot{\delta}}{l(n)}$$
$$l(n+1) = l(n) + 1 - \frac{|\delta|}{\pi}$$

where k is a normalization constant, δ is the angle with which the ant is turning its current direction and the step width is assumed to be 1.

¹Wehner1988

Discussion of the pathintegrator

- ...
- ...
- ..

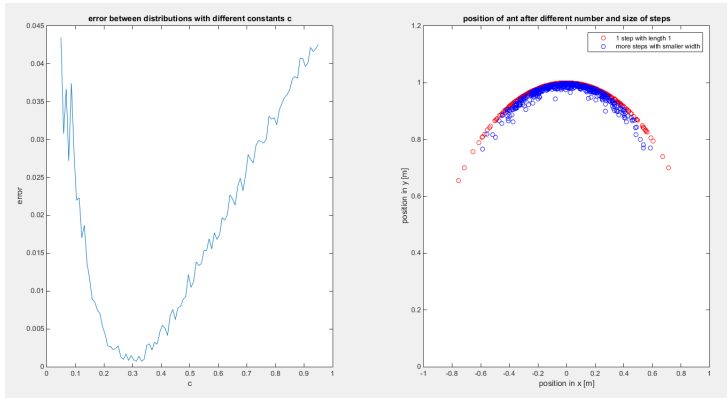


Figure : Variance for stepwidth

Results of the pathintegrator

- ...
- ...
- ..

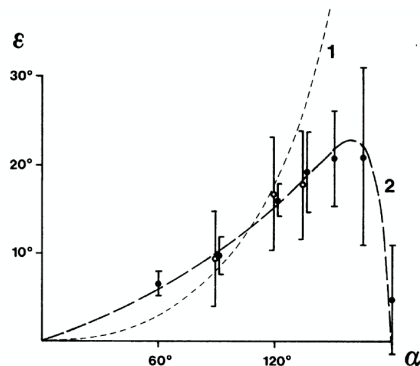


Figure : Angular Error according to Wehner1988

Results of the pathintegrator

- ...
- ...
- ..

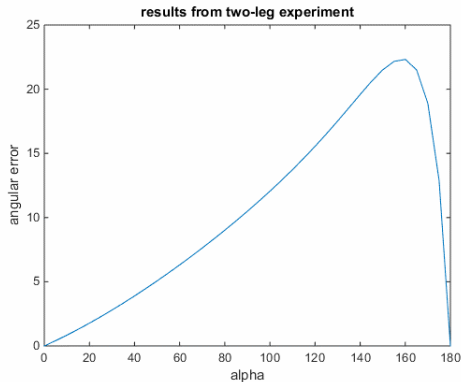


Figure : Angular error produced by our model



Results of the pathintegrator

Comparison

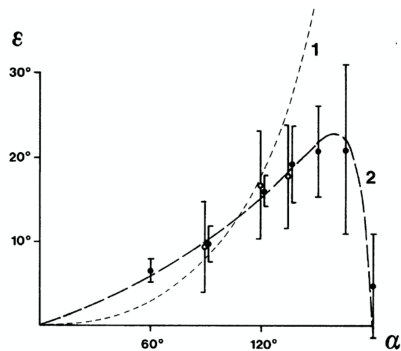
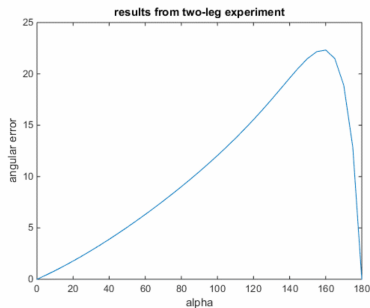


Figure : Comparison

Local Orientation

Bla bla

Outlook and Conclusions

Bla bla

Thanks for your attention

Questions ?