



Bundeswehr School of Dog Handling



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BASIS

17.03.2015

VS - NUR FÜR DEN DIENSTGEBRAUCH

1



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2



Effect of masking substances on the performance of explosive detection dogs



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Effect of masking substances on the performance of explosive detection dogs

Responsible for conducting the experiment:

Major (VC) Dr. Michaela Schneider

Working dog handlers and their dogs of the
Instruction and Experimental Group

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Research question of the experiment

Are foreign substances capable of masking the scent of an explosive?

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Masking

Thesis of the question:

One scent is superimposed or masked
by another scent

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6



Masking

Explanation:

1. Competition for binding sites

When two substances bind to the same olfactory receptor and one of them has a higher affinity, one scent can block the other or change the olfactory impression.

2. Physiology of olfactory perception

When mixtures of scents are perceived as one consistent scent, the ability to recognize individual components is very limited. However, this limited ability can be improved by training.

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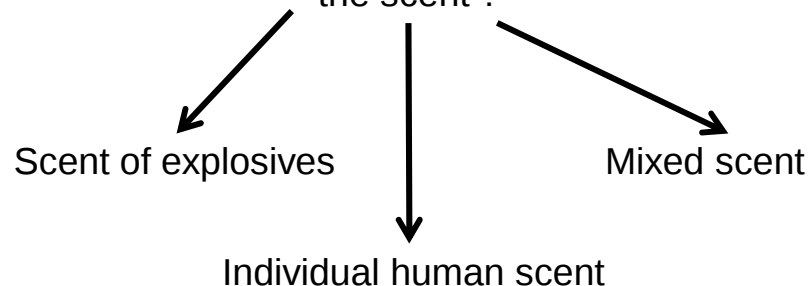
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7



Problems in the context of training for the detection of explosives

What do the dogs learn when they are picking up
the scent ?



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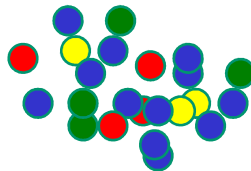
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8



Mixed scent

Experiments with rats, mice and men reveal:
When a mixed scent made up of different unknown individual components is perceived for the first time, only the mixed scent is learned and not the individual components.



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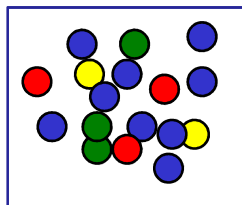
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9



Mixed scent

Conclusion drawn from different studies:
A mixed scent of four or more components is perceived as a consistent scent, not as the sum of different individual components.



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Mixed scent Influence of learning

The ability to differentiate between scents can be trained and improved through training.

Experiment with rats

Rats were unable to distinguish two very similar individual components in a mixed scent.

Having been exposed to the individual components for an extended period of time (2 hours per day for a total of 20 days), however, the rats were able to distinguish both substances.

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Another problem to be solved

Does masking depend on concentration level?

Does the exposure time of a foreign substance on the olfactory mucous membrane have an impact on the masking effect?

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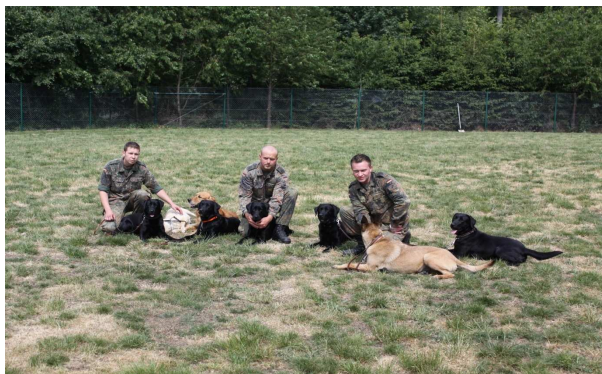
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12



Animals, material and method

Animals: 8 dogs 6 Labrador retrievers
 1 Golden retriever
 1 Belgian shepherd dog (Malinois)



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13



Animals, material and method

Animals: 8 dogs 6 Labrador Retriever
 1 Golden Retriever
 1 Malinois

Explosive: technically pure TNT

Foreign substances: petroleum
 n - Decan
 each in 2 concentration levels (low + saturation)

Environment: standardized environmental conditions in
 the experiment container at $20 \pm 1^\circ\text{C}$

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14



Standardized environmental conditions Experiment container



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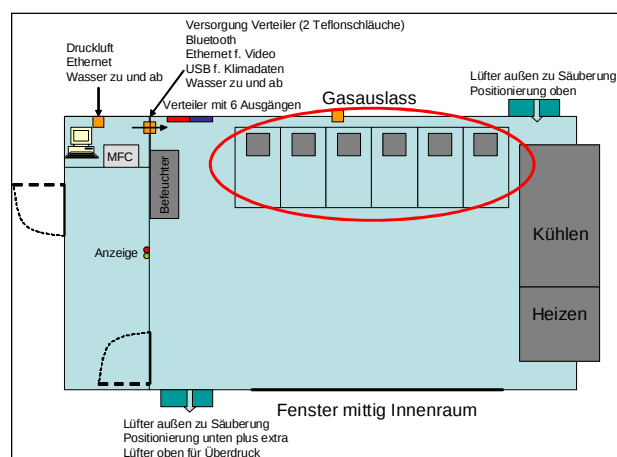
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15



Standardized environmental conditions Experiment container



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16



Standardized environmental conditions Experiment container



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Sniffing test boxes



Volume: approx. 45 l

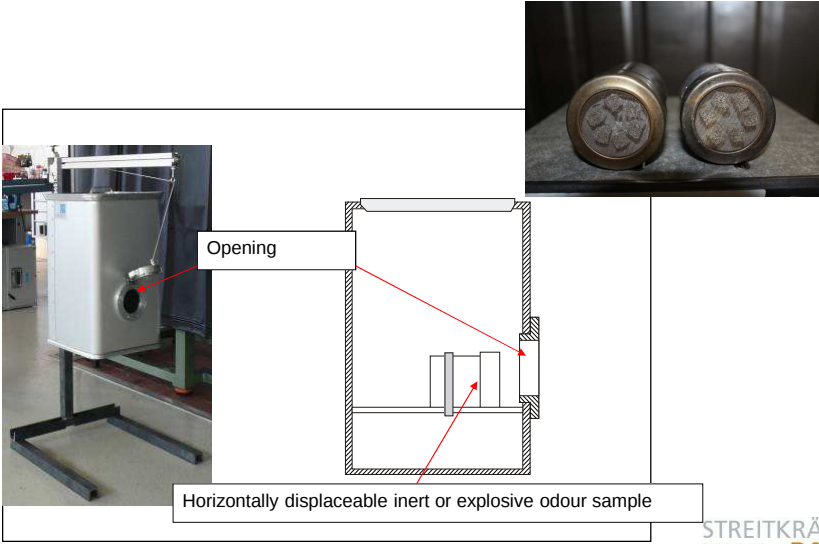
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Sniffing test boxes

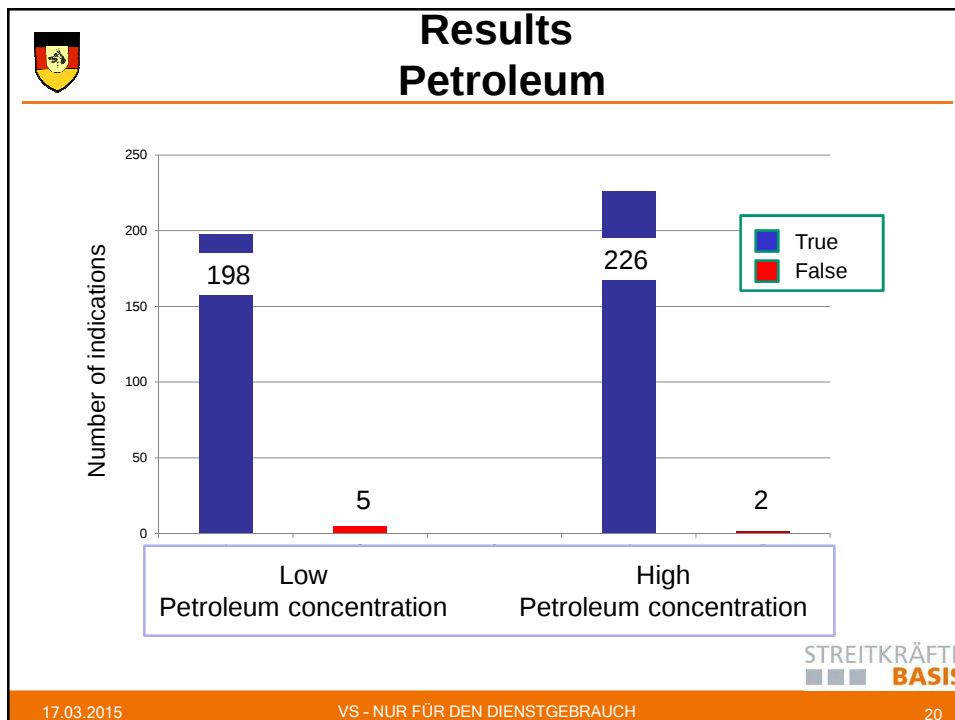


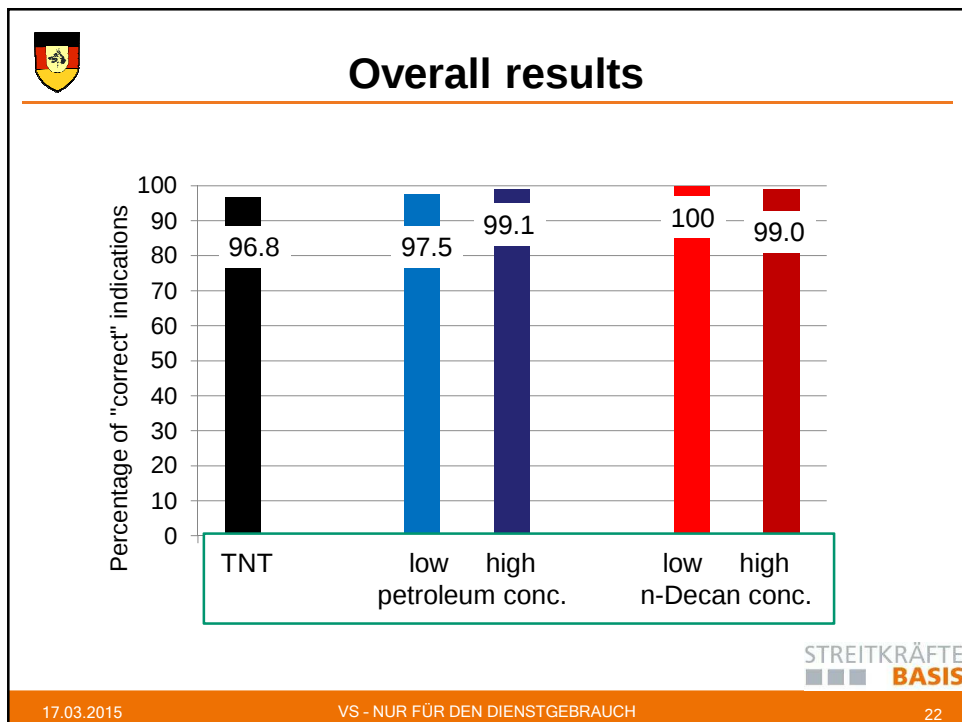
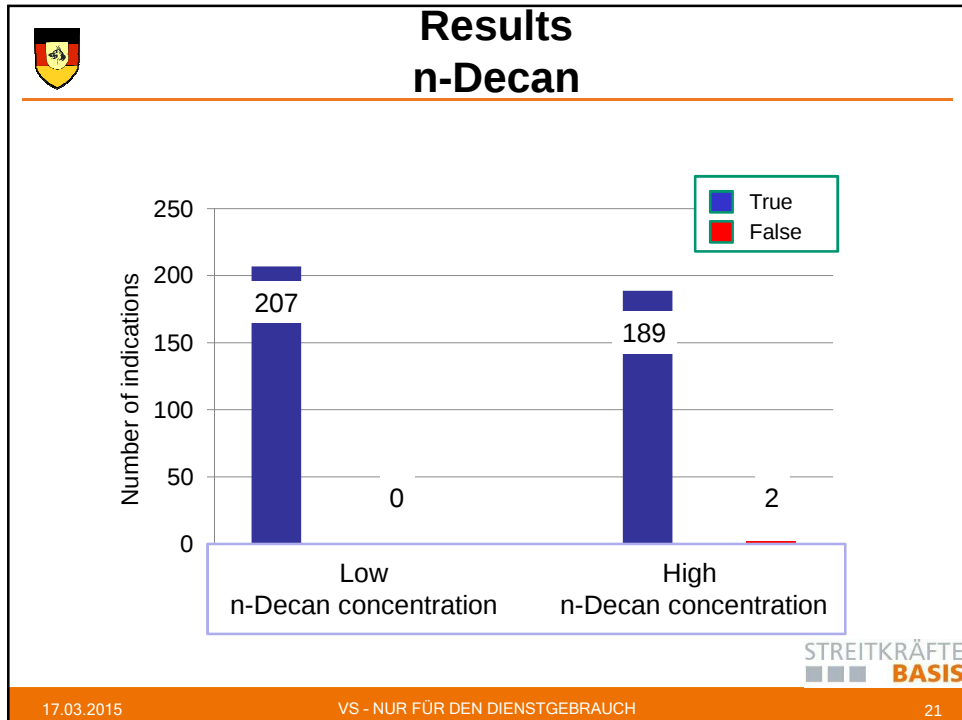
Opening

Horizontally displaceable inert or explosive odour sample

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Summary of results

Neither Petroleum nor n-Decan can mask TNT

High concentrations do not affect the detection rate
either

Repeated exposition to the interfering substances (4-7
search runs per day / 5 working days a week) had no
influence on search performance

If handled skillfully, even "dull" experiment sessions do
not result in a loss of motivation and, thus, in false
alarms

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