

Behavioral Data Collection: Theory and Practice



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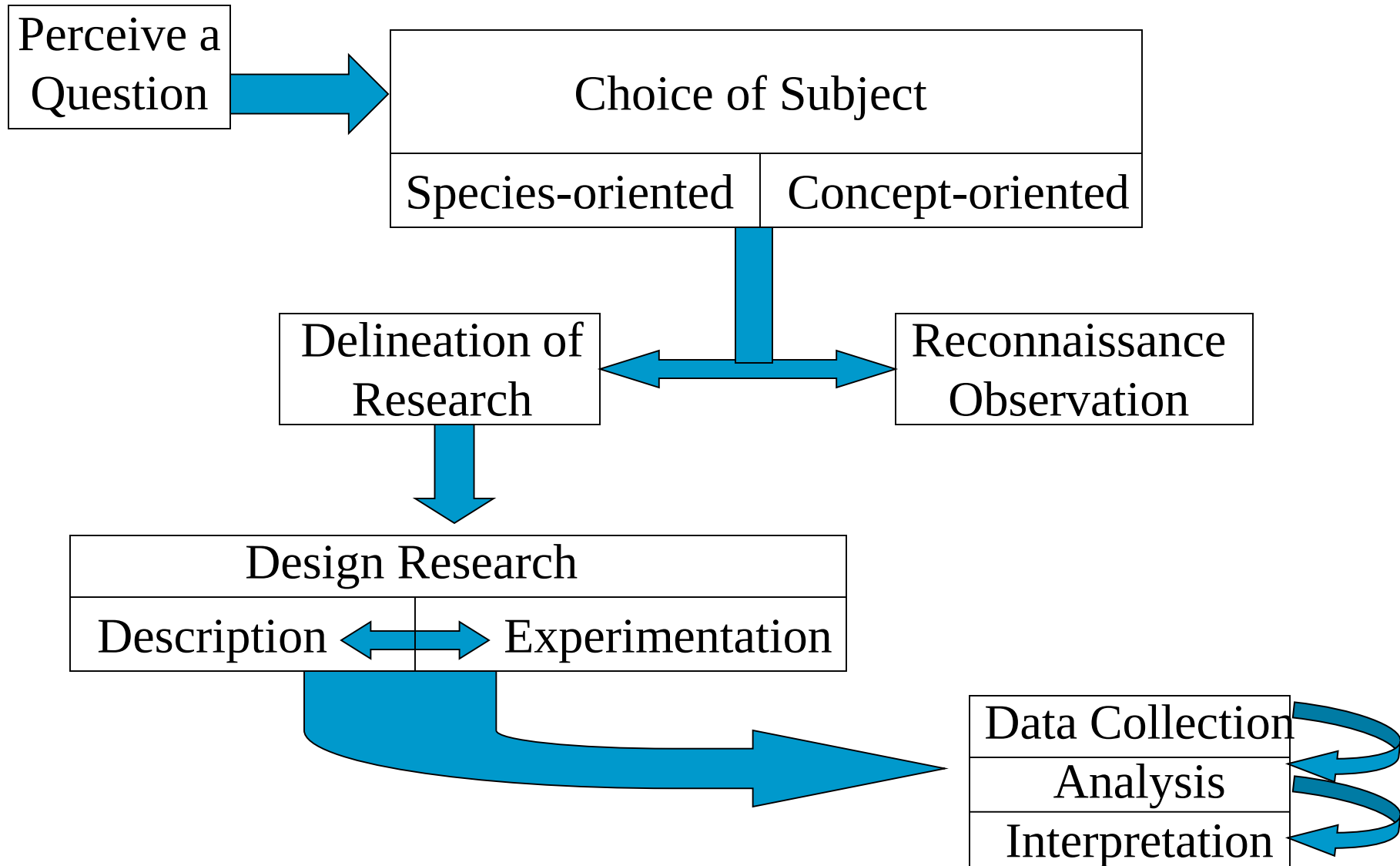
From “Watching” to “Observing”



With thanks to my mentors
in animal behavior: Drs.
Samuel Ha, Peter Weigl and
Philip Lehner



Theory: The “Ethological Approach”



Delineation of Research: Research Questions

What are the primary daily activities engaged in by this herd?

Where in the pasture do they graze?

When during the 24-hour day do they graze?

Who (which individuals) initiate the different activities?

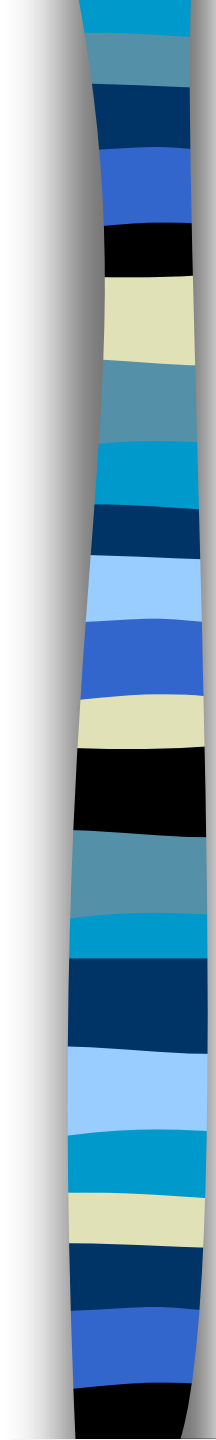
How do they determine which plants to graze on?

Why do they graze in the temporal and spatial patterns observed?



What, Where, When, and Who are descriptive;
How and Why (usually) require experimentation.

Red Deer herd in pasture



Delineation of Research: Ethogram

“A set of comprehensive descriptions of the characteristic behavior patterns of a species.” Brown 1975

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- Level of the behavior



- Social interaction

Delineation of Research: Ethogram

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- Level of the behavior

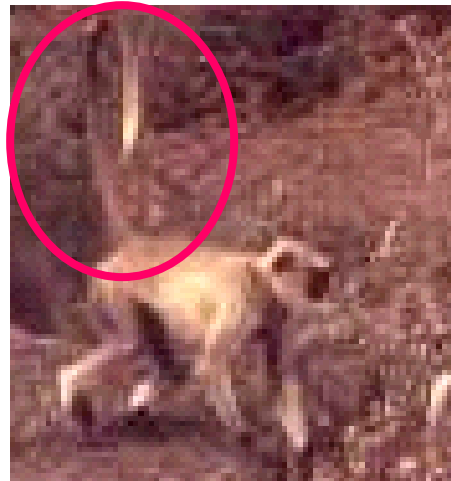


- Social interaction
- Individual behavioral act

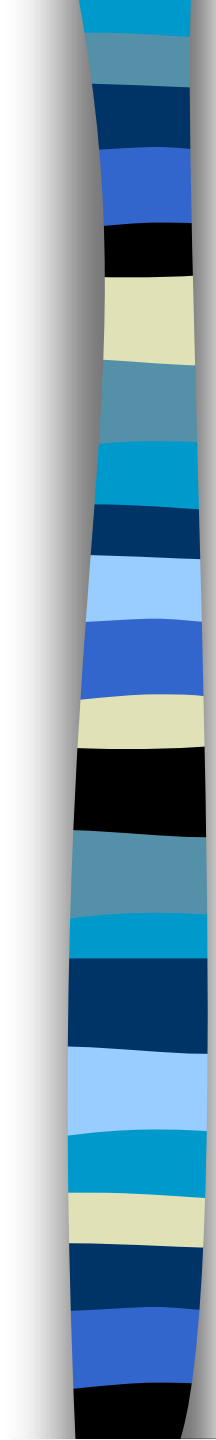
Delineation of Research: Ethogram

“A set of comprehensive descriptions of the characteristic behavior patterns of a species.” Brown 1975

- Level of the behavior



- Social interaction
- Individual behavioral act
- Component part of act



Delineation of Research: Ethogram

“A set of comprehensive descriptions of the characteristic behavior patterns of a species.” Brown 1975

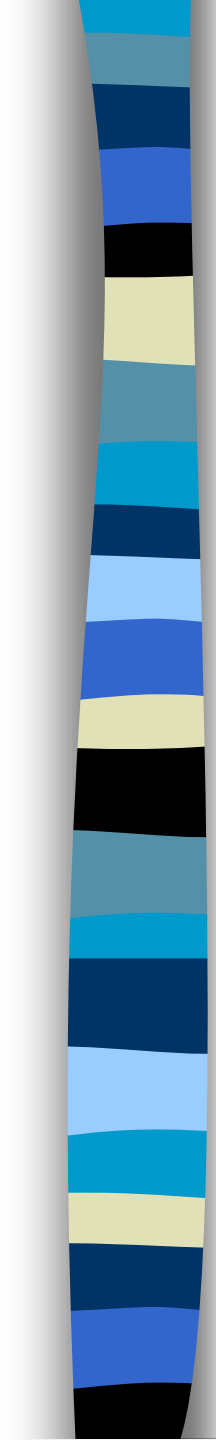
- Level of the behavior
- Empirical vs. functional definitions

“Approach”, not “attack”

“Inactive”, not “resting”

“Within 2 meters”, not “close”

Watch out for aggression and play!



Delineation of Research: Ethogram

“A set of comprehensive descriptions of the characteristic behavior patterns of a species.” Brown 1975

- Level of the behavior
- Empirical vs. functional definitions
- States vs. events

States have duration, Events do not.

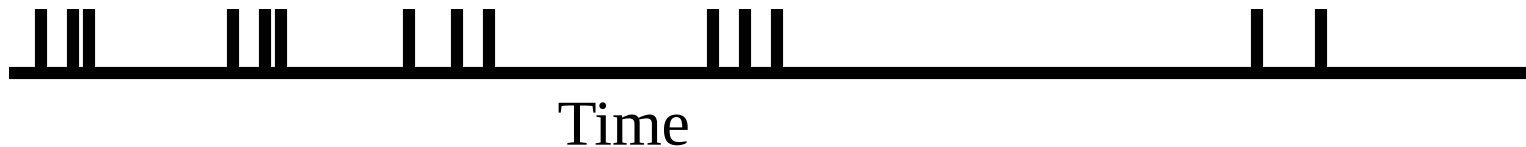
States can be counted and measured (timed),

Events are only counted

Delineation of Research: Ethogram

“A set of comprehensive descriptions of the characteristic behavior patterns of a species.” Brown 1975

- Level of the behavior
- Empirical vs. functional definitions
- States vs. events
- Bouts
 - Change in behavior
 - Bout criterion interval



A Note about Sources of Error

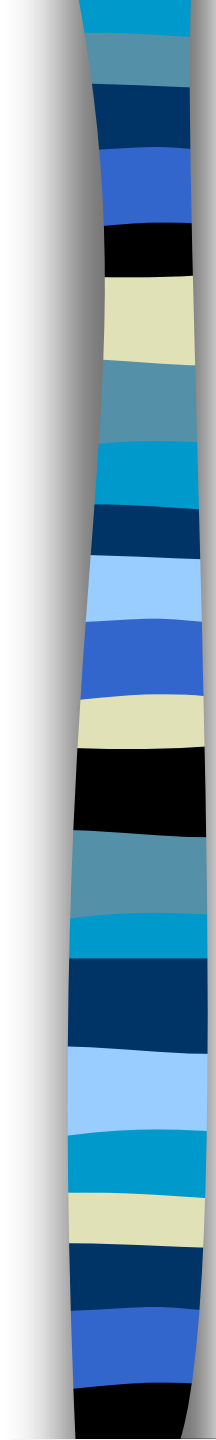
Be ever vigilant!



Results(?)

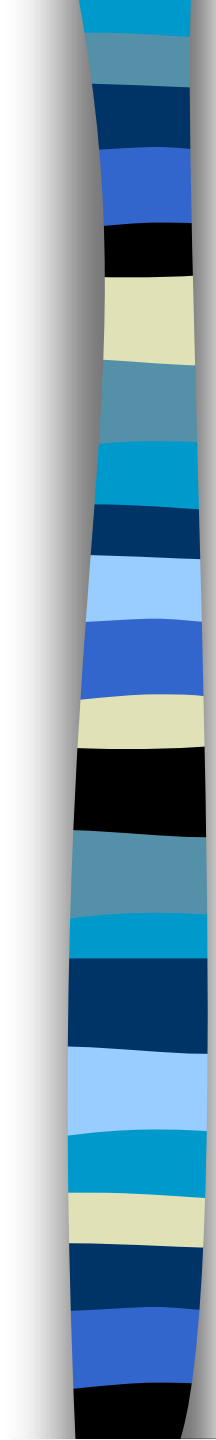
Computational error

Error of recording



Scales of Measurement

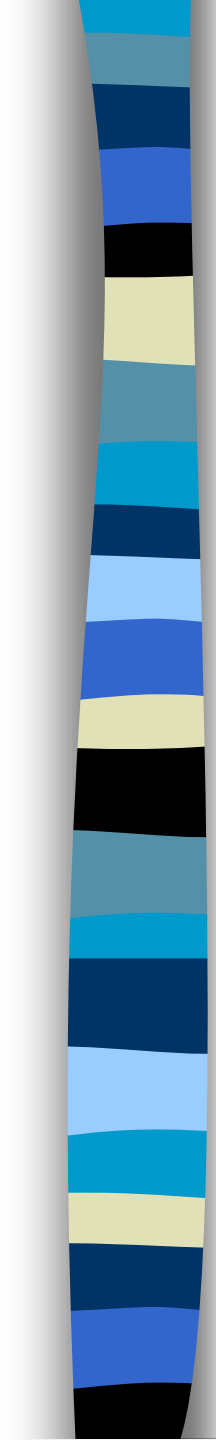
- Nominal
 - Counts or frequencies of qualitatively different categories (behaviors); very low statistical power
- Ordinal
 - Rankings of response or intensity; w/o definable differences between ranks (“equal intervals”)
- Interval
 - “Measured” variable with quantifiable, physical scale but no absolute zero
- Ratio
 - “Measured” variable with quantifiable scale and absolute zero



Example of an ordinal scale

Presentation of stranger male model into yellow-headed blackbird territory (Animal Behaviour 35:1673)

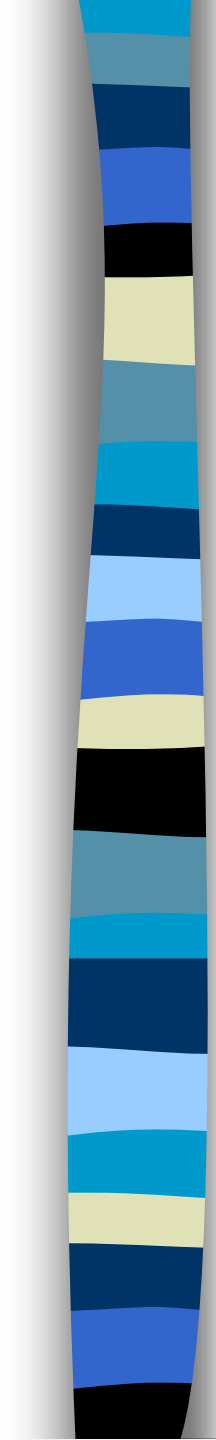
Score	Definition
1	Distant ($>5\text{m}$) and nonattentive
2	Close ($<5\text{m}$) and nonattentive
3	Distant, silent observation
4	Close, silent observation
5	Distant, agitation
6	Distant, agitation and vocalization
8	Close, agitation
10	Close, agitation and vocalization
13	Direct attack



Sampling Methods (from Altmann, 1973)

Continuous recording

Time Sampling



Sampling Methods (from Altmann, 1973)

Continuous recording

Ad libitum

Opportunistic sampling with no restraints

All occurrences

Record all occurrences of selected behavior(s)

Sequence

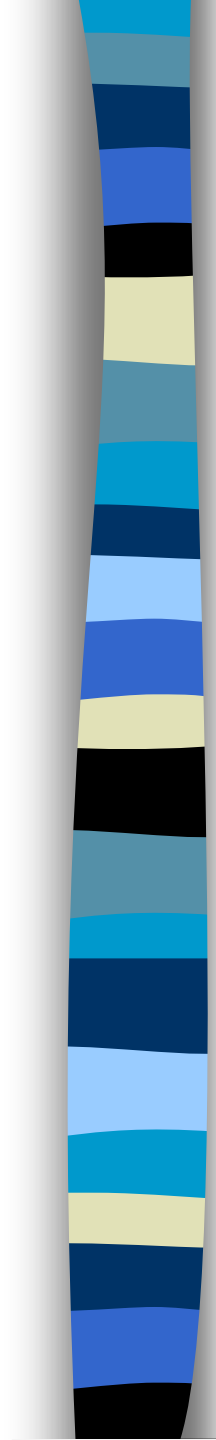
Record all occurrences of inter- and intra-sequences of behavior

Sociometric

Record results of all interactions between individuals

Focal animal (pair, group)

Restrict data collection during a sample period to one animal (pair, group)



Sampling Methods (from Altmann, 1973)

Time Sampling

One/Zero

Record the occurrence (not frequencies) of selected behaviors during sequential sample intervals

Instantaneous/Scan

Record behavior at predetermined time points

Practice: From Pencil to PDA

- Pencil and paper
 - Convenient, cheap, low-tech
 - Limited, error-prone, non-digital, timing an issue
- The Role of the Field Notebook
- Possible collection methods:
 - Ad-lib, all-occurrences, focal(?), one-zero, scan(?)



Practice: From Pencil to PDA

- Laptop computer
 - Powerful, digital, error-checking, accurate timing
 - Expensive, bulky, delicate
 - Possible collection methods
 - Ad-lib, all-occurrences, focal, one-zero, scan
 - Software: ObserverTM, Event



Practice: From Pencil to PDA

- Personal Digital Assistant (PDA): Palm or WinCE
 - Powerful, digital, error-checking, accurate timing, portable, moderate cost
 - Moderate cost, delicate, ad-lib difficult
 - Possible collection methods: Ad-lib(?), all-occurrences, focal, one-zero, scan
 - Software: Observer™, Event-Palm



Event-Palm

Custom software written for the Palm OS family of PDA's.

An Example:

Killer Whale Focal Follow

Records all-occurrences of
percussive and other social
behaviors

- Also records scan-sampled energetic states every 2 minutes
- ID (pod, age/sex, individual), Location (GPS), and Speed



Event-Palm

Custom software written for the Palm OS family of PDA's.

An Example:

Focal Data on Zoo Siamang

Records all behaviors by male Siamang including events and states and social (human and cagemate) interactions.



Event-Palm

Custom software written for the Palm OS family of PDA's.

An Example:

Social Behavior of African Elephants in Kenya

Records spatial data...



Event-Palm

Custom software written for the Palm OS family of PDA's.

An Example:

Social Behavior of African Elephants in Kenya

Records spatial data,
group composition...



Event-Palm

Custom software written for the Palm OS family of PDA's.

An Example:

Social Behavior of African Elephants in Kenya

Records spatial data,
group composition, with
subcategories...



Event-Palm

Custom software written for the Palm OS family of PDA's.

An Example:

Social Behavior of African Elephants in Kenya

Records spatial data,
group composition, with
subcategories, and
detailed behavioral data,
with recipient ID and ability
to change group compositions
“on-the-fly”



Practice: From Pencil to PDA

- Smartphones and Tablets
- iOS and Android
- WiFi and 3/4G direct access to Internet data

EVENT-App custom software

The screenshot shows a web browser window with the address bar displaying `nsbapp.com/hwgnTemperamentD`. The page title is "Temperament Data Collection - Behaviors". At the top, there are three blue buttons: "Back", "Esc", and "Next". Below these, the status "Run: 1 Interval: 3 Seconds remaining: 0" is shown. A white text box contains the instruction "Finish behavior entry NOW; click 'Next!'". The main content area is divided into two sections: "Directed Behaviors" and "Other Behaviors". Each section has a search input field and a "Clear" button. The "Directed Behaviors" section contains a grid of buttons for: Lipsmack, LEN, Hard Stare, Fear Grimace, Open Mouth, Yawn, Cage Shake, Lunge, Grab, Reach, Present Rump, and Present Side. The "Directed Towards:" label is followed by a dropdown menu. The "Other Behaviors" section contains a grid of buttons for: Grunt, Bark, Shriek, Coo, Scratch, Grind, Manipulate Self, Manipulate Object, Body Shake, Eat/Drink, and Urinate.

Practice: From Pencil to PDA

- Smartphones and Tablets
- iOS and Android
- WiFi and 3/4G direct access to Internet data

EVENT-App custom software

The screenshot displays the EVENT-App custom software interface, which is designed for data collection on mobile devices. The interface is organized into several sections with buttons for recording various activities.

Top Navigation: A row of blue buttons includes "Start", "Set Start Time", "Quit", "Finish", and "Notes". Below these is a "Sync" button and a status indicator showing "050 to 060 : Remaining: 001". A timer box displays "050 to 060 Seconds".

Approach Machine: This section contains buttons for recording the animal's approach to the machine. The "Walk:" row has "Sidelong" and "Head-on". The "Tail position:" row has "Up" and "Down". The "Side choice:" row has "Right" and "Left".

Body, tail position, and tail movement while eating at machine: This section contains buttons for recording the animal's body and tail movements while eating. The "Body:" row has "Crouch", "Sit", and "Stand". The "Tail position:" row has "Up", "Down", "Curled", and "Flat". The "Tail movement:" row has "Swish", "Twitch/flick once", "Twitch/flick repeat", "Slap", and "Quiver".

Other Activities of Interest: This section contains buttons for recording other activities. The "Sniff:" row has "Food right", "Food left", "IFeeder", and "Airother". The "Look around:" row has "Look". The "Side Choice:" row has "Right" and "Left". The "Side Switch:" row has "to Right" and "to Left". The "Remove Food:" row has "Paw" and "Mouth". The "Walks away:" row has "Tail up" and "Tail down".

Interactions with Owner: This section contains buttons for recording interactions with the owner. The "Meow" row has "Meow", "Look at owner", and "Rub owner".

The End

