Dement and Kleitman
1957 Bio Perspective

Aim: determine the relationship between eye movements and dreams.

Hypothesis 1: There will be a significant association between REM and dreaming.

Hypothesis 2: There will be a significant positive correlation between the duration of dreams and duration of eye movement.

Hypothesis 3: There will be a significant relationship between eye movement patterns and dream content

Sleep Drive- A major drive aroused by the physiological requirements for sleep.

Alpha Rhythm- A state in which brain waves show a dominant frequency of about 9 to 13 waves per second, usually when the person is relaxed, with eyes closed.

Sleep stages- (1-4) The changes in the brain waves indicating light to deep sleep.

Myoclonic jerk- a sudden spasm in body caused by a tiny burst of brain activity

Rapid Eye Movement sleep (REM)- Stage of sleep in which our eyes move rapidly under the lids, which is associated with vivid, visual dreams (20% of sleep).

Paradoxical sleep

Non-rapid eye movement sleep (nREM)- Stage of sleep (1-4) in which our eyes are still. It is also called quiescent (quite) sleep. This is not associated with dreaming.

Awake/relaxed = *alpha waves

STG I- pulse slows, relax, breathing uneven, waves irregular, drifting * Beta waves = small irregular waves Conscious mind

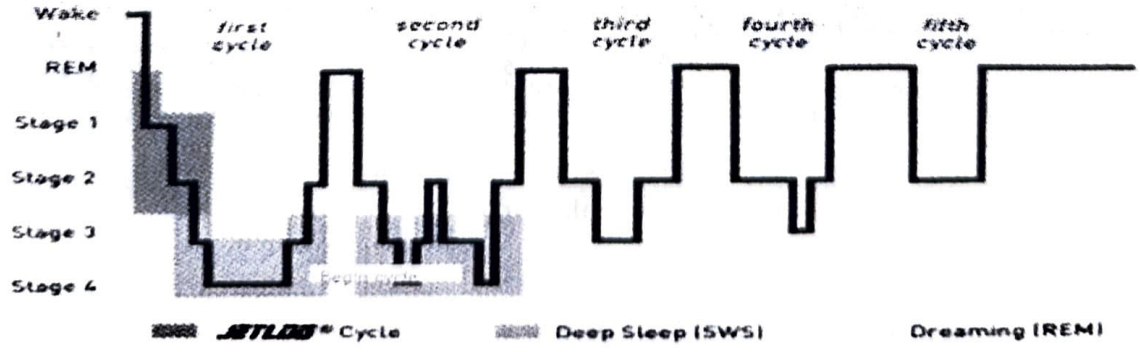
STG II- Eyes roll (10min. Later) / strange images and thoughts/ / ***sleep spindles**= fast, irregular / k **complexes**= large and slow Alpha Waves Gateway to Subconscious mind

STG III- (30 minutes later) muscles relax, blood pressure decreases, breathing becomes even- harder to wake *Theta waves = deeper sleep Subconscious mind

STG IV- Delta Sleep (dreamless oblivion) stay here about 20 min. at a time before you drift upward towards a lighter sleep. * Delta waves = slowest waves decrease through night. Stop near orning

Unconscious mind/collective Consciousness

Sleep Stages



Electroencephalograph (EEG)- Machine used to detect and record electrical activity in nerve and muscle cells when many are active at the same time. It uses macroelectrodes, which are large electrodes stuck to the skin or scalp

Frequency- The number of eye movements per minute (approximately 60/minute in REM sleep) or the number of brain waves (cycles) per second or Hertz (Hz), e.g. 13-30 Hz for beta waves.

Amplitude- "Height" of waves, e.g. on an EEG (including voltage).

Internal validity- How well an experiment controls for confounding variables. If an experiment has internal validity, the researcher is confident that it is only the IV that is affecting the DV and no confounding variables are having an impact on the results.

During a typical night, a sleeper passes through different levels of sleep in a cyclic fashion every 90 minutes.

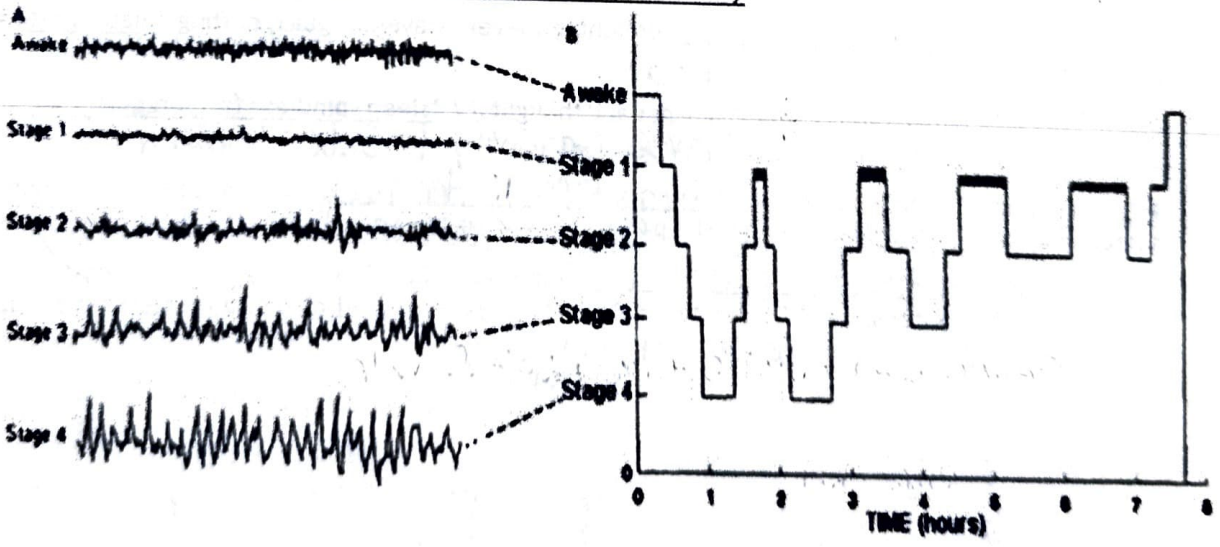
Main ways of Measuring Sleep

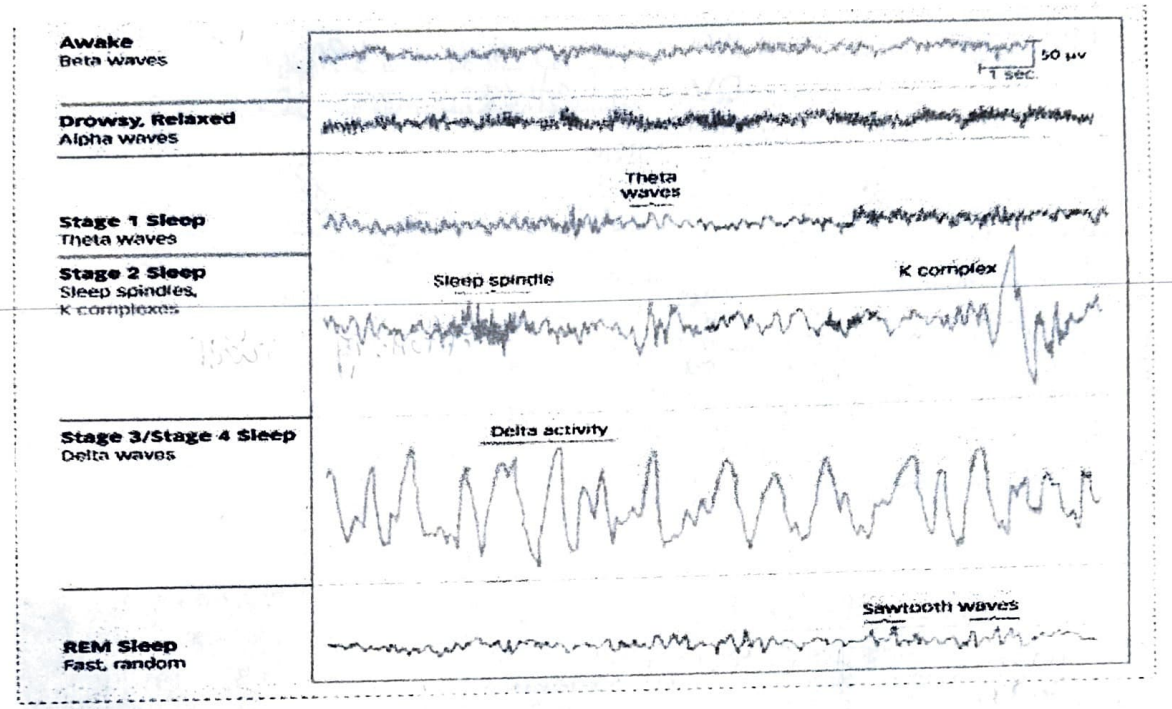
1) **EEG**- measures gross brain wave activity (large scale)

Electric (electro)....in head (encephala).....writing (gram)

2) **EMG- Measures electrical activity of muscles**
3) **EOG- Measures eye movement**

Stages of Sleep (Staircase)





Video on D&K:

Research Method (& Experimental Design if applicable) including location, identifying sample population, means of collecting data:

Location: Lab experiment (dark room)

Extraneous Variables: Consumption of caffeine or alcohol (tried to control for), consumption of foods/beverages that impact dream content, experiences that may impact sleep patterns, noises outside that would disrupt sleep (extraneous noise-situational variable), comfort level (mundane realism)

Equipment: EEG (the means of collecting data and verifying the results)

Population: Seven adult males, two adult females
(5 studied intensively, 4 had data gathered minimally with the main intent of confirming the results on the first 5.)

Experimental design: Repeated measure (**Repeated measures design is** a research **design** that involves multiple **measures** of the same variable taken on the same or matched subjects either under different conditions or over two or more time periods.)

Procedure (including defining, manipulating, operationalizing, measuring and controlling of variables):

Gave informed consent
Subjects report to lab before bed time
2 electrodes attached to eyes in order to test muscle activity
2-3 to skull to test brain activity, put into bed

Hypothesis 1:

IV – Rapid eye movements
DV – Whether or not dreaming

- **Hypothesis 1**- awoken with doorbell during various stages of REM and NREM sleep in order to record dreams into recorder. First stated if they were dreaming, and second was the content.

(those incoherent (mumbling or incomplete sentences) was not considered to be a remembered dream.

- **Schedule**- 2 awoken at random, 1 awoken 3 times in REM and 3 in NREM and continued pattern, 1 awoken randomly but told he would only be awoken during REM (told to counterbalance to alleviate demand characteristics), 1 on a whim.
- *To eliminate experimenter effects the researcher could not have contact with participant. Eliminates subject or researcher biases/presumptions as well as possibility of participants being told extent to which their eyes are moving.*

Stage of Sleep

REM — NREM

Corresponding Measured Variables

occurrence of rapid eye movement — Dream recall

Qualitative and Quantitative data collected

Results for H1

- **Table 1**- instances of dream recall after REM & NREM

Participant	Rapid Eye Movement		Non Rapid Eye Movement	
	Dream recall	No Recall	Dream recall	No recall
DN	17	9	3	21
IR	26	8	2	29
KC	36	4	3	31
WD	37	5	1	34
PM	24	6	2	23
KK	4	1	0	5
SM	2	2	0	2
DM	2	1	0	1
MG	4	3	0	3
Totals	152	39	11	149

- Results show that REM sleep is associated with dreaming, and NREM sleep is associated with periods of non-dreaming sleep

Hypothesis 2:

IV= 5 or 15 minutes of eye movement (as referenced by researcher.)
DV= how long the person thinks they are dreaming

- **Hypothesis 2**:
- **Participants are woken up** 5 or 15 minutes into REM
- **Participants were asked how long they thought the dream was (5 or 15 minutes – structured question)**

Length of REM sleep

5 minutes — 15 minutes

Corresponding measured variable

Dream duration estimation

Qualitative and Quantitative data collected

Results for H2

Table 2- Results of dream duration estimates after 5/15 mins

	Estimate (in minutes) After 5 minutes REM		Estimate (in minutes) After 15 minutes REM	
Participant	Right	Wrong	Right	Wrong
DN	8	2	5	5
IR	11	1	7	3
KC	7	0	12	1
WD	13	1	15	1
PM	6	2	8	3
Total	45	6	47	13

Results for H2

- Results revealed that all but one of the participants were able to choose the correct dream duration fairly accurately
  - Participant (DN) could only recall latter part of the dream and so underestimated its length. He consistently underestimated dream duration, often choosing 5 min instead of 15. (refer to Table 2)
  - Using REM periods over a range of durations, narratives from 152 dreams were collected. However, 26 of these could not be used as they were too poorly recorded for accurate transcription.
- Even though this was affected by how expressive the participant was a significant positive correlation was found, ranging from .4 to .71 for each participant
- Findings show that we dream relatively in real time.

Hypothesis 3:

IV= eye movement patterns
DV= actual content of dream

- Hypothesis 3
- Participants were awoken as soon as 1 of 4 patterns persisted for at least a minute:
- (a)vertical eye movements
- (b) horizontal eye movements
- (c) both vertical and horizontal eye movements
- (d) no movement
- Describe the dream content Only

H3 Results:

- Results: Periods of pure vertical or horizontal patterns were rare.
- 35 awakenings from the 9 subjects Only one instance of pure horizontal (dream content was people throwing tomatoes) movement was recorded and three instances of pure vertical (dream content was climbing a ladder, throwing basketballs at a net, standing at the bottom of a cliff & looking up)
- On 10 occasions subjects were awakened after a period of little/no eye movement
- **Definite relationship** between dream content and eye movement
- In the 21 awakenings after a mixture of movements, subjects were always looking at things close to them (people & things) (No recall of distant or vertical activity)

GENERAL Results/Data:

REM occurred to each participant each night.

Low voltage of EEG -- accompanied REM

High voltage of EEG -- in between REM cycles (nREM)

Negative correlation (opposite relationship) **between voltage and movement patterns (eye activity)**

REM never occurred at the beginning of a sleep cycle.

Dream recall during non-REM can be assumed because the memory of the dream persisted for an unusually long time.

REM periods that were not terminated by awakening varied 3 – 50 minutes, (average of 20 minutes)

Duration of non-termination lasted longer as night continued

Intervals = regular ... patterns= unique

Mean period time phase between entire group – 92 min. (90 minute cycle generally)

Conclusions (including analysis of reliability, validity, extraneous/confounding variables, and other strengths and weaknesses):

DREAMS are more likely to occur during REM sleep

Ecological Validity low due to lab environment and electrodes utilized. Furthermore, the extent of a participant's dependence on coffee/alcohol may affect sleeping patterns or dreams.

Variables:

extraneous/confounding/participant: prohibition of caffeine/alcohol may have changed comfort and patterns of sleep as well as dreams

researcher/experimenter variable: occasionally entered room to further question subjects, could cause anxiety in subjects or other emotional factors/responses....could affect further sleep patterns or dreams

situational variable: environment/ lab may have caused change in sleep patterns

Demand characteristics were generally alleviated (reduced) by participants recording responses – could have been when researcher entered for questioning

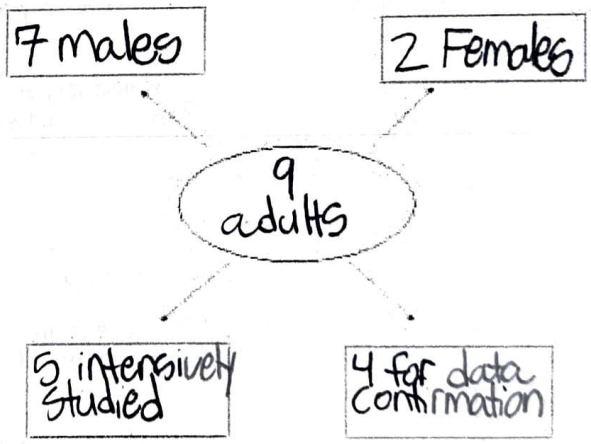
Ethical considerations

- Artificial setting may have inhibited restful sleep.
- Subject WD was mislead (deception)/ can't give informed consent
- Restricted something they may normally consume. (Alcohol and caffeine)
- Having them strapped to electrodes may have caused discomfort.
- Could cause residual trauma or evoke previous emotional distress.
- (Being watched while sleeping in a strange room)

- **Implications (short-term & long-term):**
- Could potentially assist in learning more about how abnormal sleep patterns and dreams affect a person physically, mentally and emotionally during a day/life
- -could allow us to understand the importance of sleep and sleep/dream patterns (i.e the implications of abnormal sleep patterns)

Other points to evaluate

- **Generalizability**- Only 5 people were studied "in detail" and four more used to confirm the findings.
- Could make it difficult to generalize beyond the sample of people because of the small sample size.
- These 5+4 people may not represent a wide cross-section of society in terms of how we dream and what we dream about.



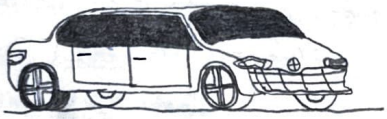
Reductionism- the practice of analyzing and describing a complex phenomenon in terms of a simpler reason.

Findings are all based around biological mechanisms affecting our dreaming state. Some psychologists may see this as being "reductionist" as there are *psychological mechanisms that could be affecting dream content.*

Strength and Weaknesses of the D&K STUDY

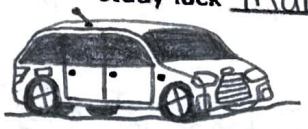
Strength

- Scientific/ objective measurements
- Lab: D&K **controlled** many variables (pre-study levels of caffeine and alcohol, the doorbell sound, the EEG monitoring). This means that another researcher could easily replicate this study to test it for reliability.
- The high level of control of variables meant that for each part of the experiment, D&K could confidently conclude cause & effect (that dream recall is affected by stage of sleep).



Weakness

- Self report of dreaming & content was subjective
- Sample size and makeup (cannot generalize)
- No background provided for Ps (can be Ethnocentric)
- Method of waking subject may have influenced ability to recall dreams
- Correlation doesn't mean causation
- Participants had to sleep in an artificial setting (in a lab, with electrodes on their head). Therefore, the study has low ecological validity.
- Being woken up and then asking to recall dream content or estimate dream length is not a normal activity for people. Therefore, the study lack mundane realism.



Application to everyday life- The study could identify when P's were entering REM or nREM sleep. The EEG monitor that did this could help sleep scientists to identify whether a person has a disorder based around REM sleep

Individual and situational explanations Individual people are different, might have different levels of success guessing dreaming duration. The situational is supported by the lab setting.

The use of children are NOT APPLICABLE

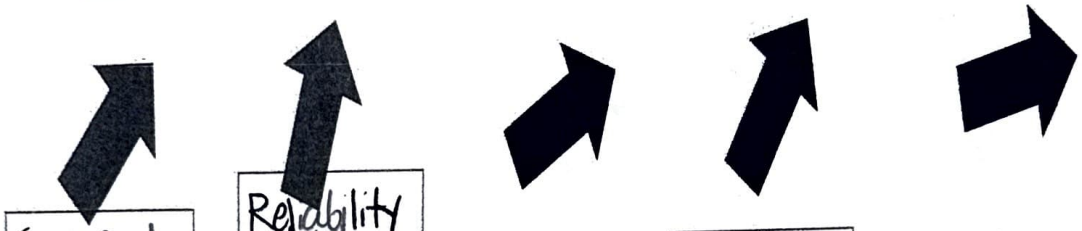
The use of animals are NOT APPLICABLE

Nature versus nurture:

NATURE: the experience of REM and nREM sleep are universal and therefore due to nature. All P's in the study experienced both types of sleep and also the majority of dreaming took place during REM sleep.

NURTURE: This also suggests individual differences between P's and this could be as a response to the environment as some of the P's had very disturbed sleep, possibly due to the uncomfortable environment of the sleep laboratory. This shows that environmental factors can also affect sleeping patterns.

G R A V E



G	R	A	V	E
Generalizability is moderate to high because patterns demonstrated in all three hypotheses (biological)	Reliability is high because of apparatus recording patterns, information, and Patient Verification.	This is applicable for further studies.	Validity is generally high as the researchers stuck to their hypotheses and procedures.	More positive ethics than negative may cause distress, discomfort, lack of proper sleep.