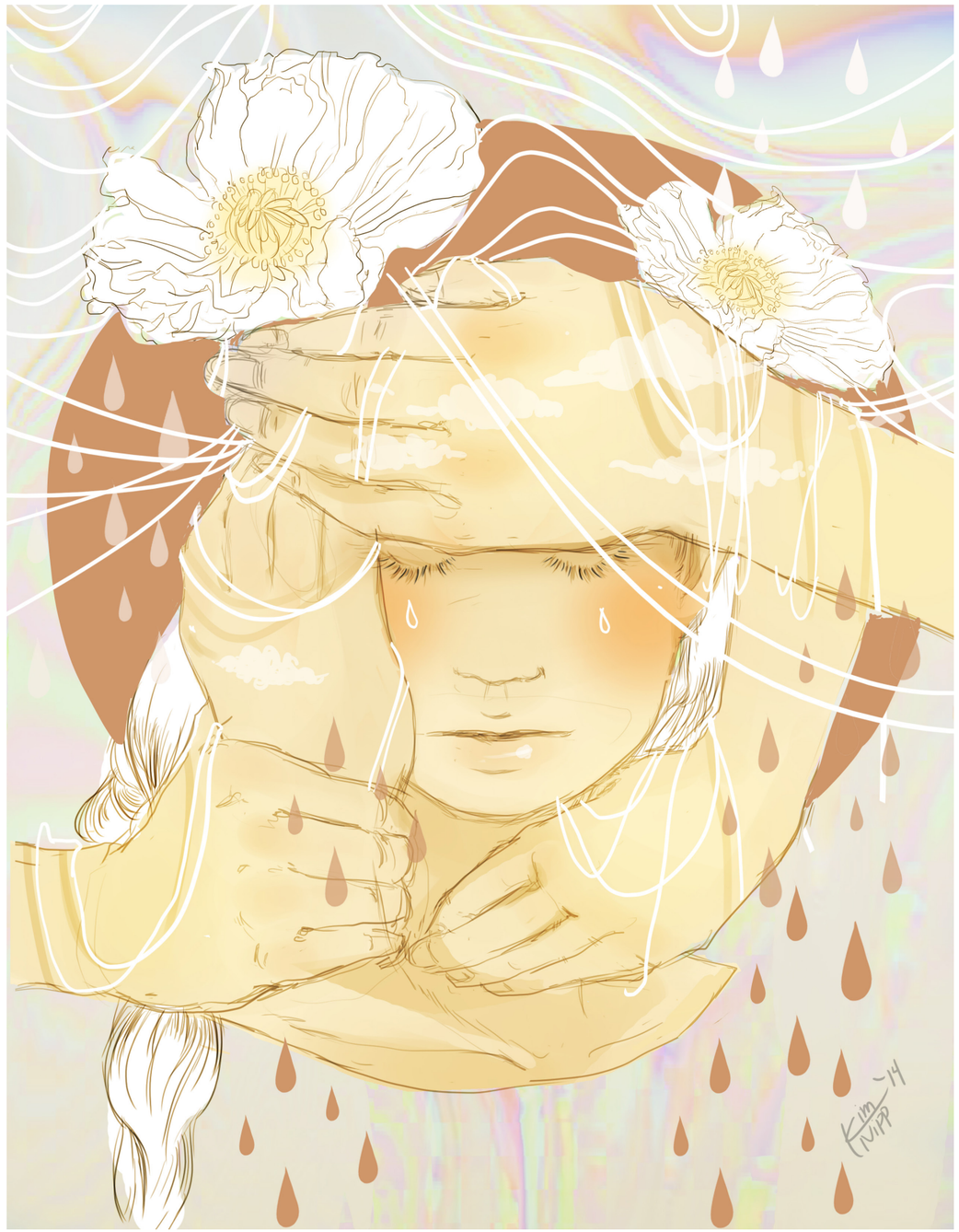
Dreaming



steven j. barnes

- Discuss dream research. Why do we dream?
- Discuss the evidence for the REM = dreaming equation.
- Discuss some commonly held beliefs about dreaming.
- Discuss three different theories of why we dream.
- Explain recent research on the ‘recording’ of dreams using functional magnetic resonance imaging

Learning Goals

Characteristics of REM Sleep

Rapid eye movements
Loss of muscle tone
Low amplitude, high-frequency EEG
Activity increases to waking levels in many brain structures.
General increase in autonomic nervous system activity.
Some muscle activity.
Some degree of clitoral or penile erection.
Dreaming

REM Sleep

Does REM Sleep = Dreaming?

When REM sleep was characterized by students in the Kleitman lab in 1953, they immediately saw the potential for it being a physiological correlate of dreaming. They began waking subjects in the middle of REM episodes and asking them if they had been dreaming.

Dreaming

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The most convincing piece of evidence came from the following observation: In their studies, 74-80% of REM-sleep awakenings led to dream recall, whereas only 7-9% of NREM-sleep awakenings led to dream recall.

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This relatively strong relationship allowed them to test some common beliefs about dreaming.

Dreaming

Some commonly held beliefs about dreaming.

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Dreaming

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Spraying water on sleeping subjects caused about half of the subjects to incorporate the water into their dreams.

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However, most stimuli are neither incorporated into dream content nor elicit a behavioural response. Certain stimuli are more likely to be incorporated: spray of water, pressure on limbs, and meaningful words.

Some commonly held beliefs about dreaming.

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2. Most people believe sleeptalking and sleepwalking (somnambulism) occur during dreams.

Dreaming

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Sleepwalking is most frequent during stage 4 sleep.

Sleeptalking can occur in any stage of sleep; but often occurs during transitions to wakefulness.

Does REM Sleep = Dreaming? Really?

Despite the appeal of a REM = Dreaming equation, it is an oversimplification:
1. NREM dreams exist. You just have to ask the right questions.

In initial stage 1: 80-90% of wake-ups (shorter than REM dreams, hypnagogic-like).

In stages 2, 3, and 4: 50-70% of wake-ups (early in the night: shorter, more thought-like, less vivid, less visual, and less conceptual; later in the night: longer and hallucinatory--generally indistinguishable from REM dreams).

Dreaming

Does REM Sleep = Dreaming? Really?

Despite the appeal of a REM = Dreaming equation, it is an oversimplification:

1. NREM dreams exist. You just have to ask the right questions.
2. Dreaming and REM sleep can be dissociated:

- forebrain lesions can abolish dreaming but spare REM sleep
- brainstem lesions can eliminate REM sleep, but do not abolish dreams

Dreaming

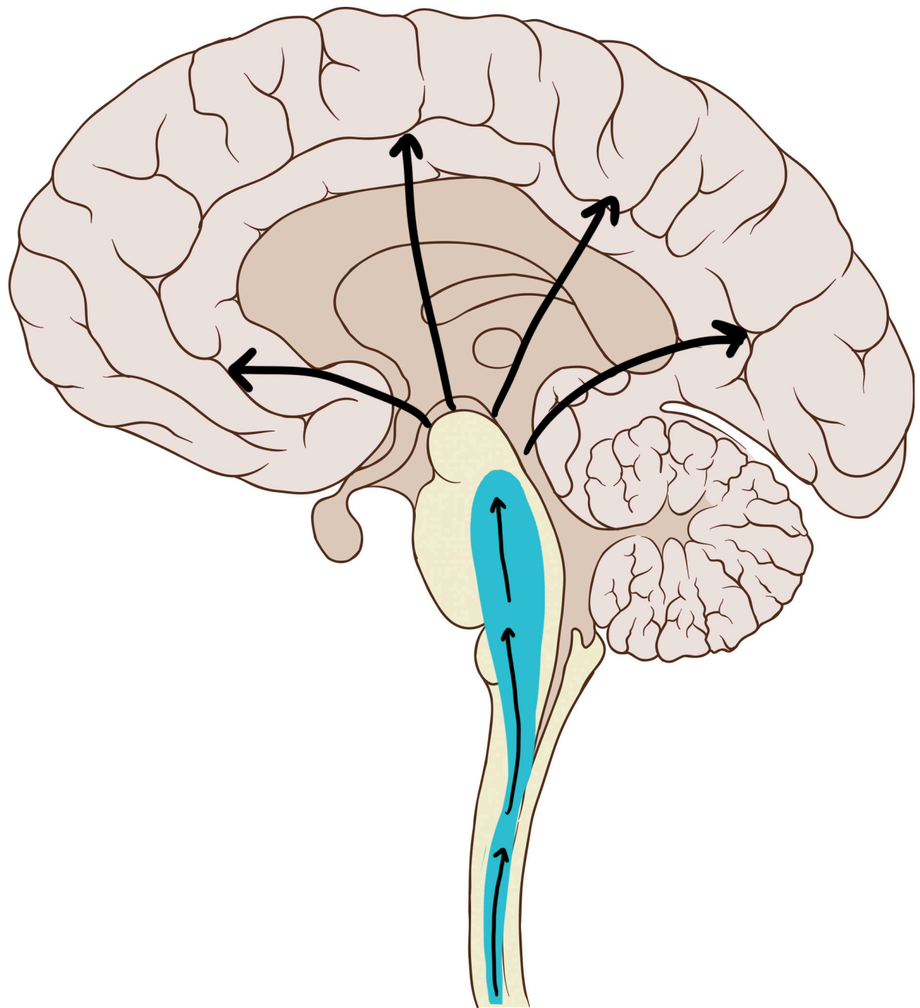
Why Do We Dream?

1. It is our brain trying to make sense of it's own sleep-related activity (Hobson, 1989): Hobson's (1989) activation synthesis hypothesis.

Dreaming

Why Do We Dream?

1. It is our brain trying to make sense of it's own sleep-related activity (Hobson, 1989). During REM sleep, many brainstem cells become active and send random signals to the cerebral cortex. These signals result in a dream that is the cortex's best effort to make sense of them. Like looking at an inkblot:



Dreaming

Why Do We Dream?

1. It is our brain trying to make sense of it's own sleep-related activity.

1a. Dreams are simply left overs from a mind designed for a day job (Flanagan, 2001).

Dreaming

Why Do We Dream?

1. It is our brain trying to make sense of it's own sleep-related activity.

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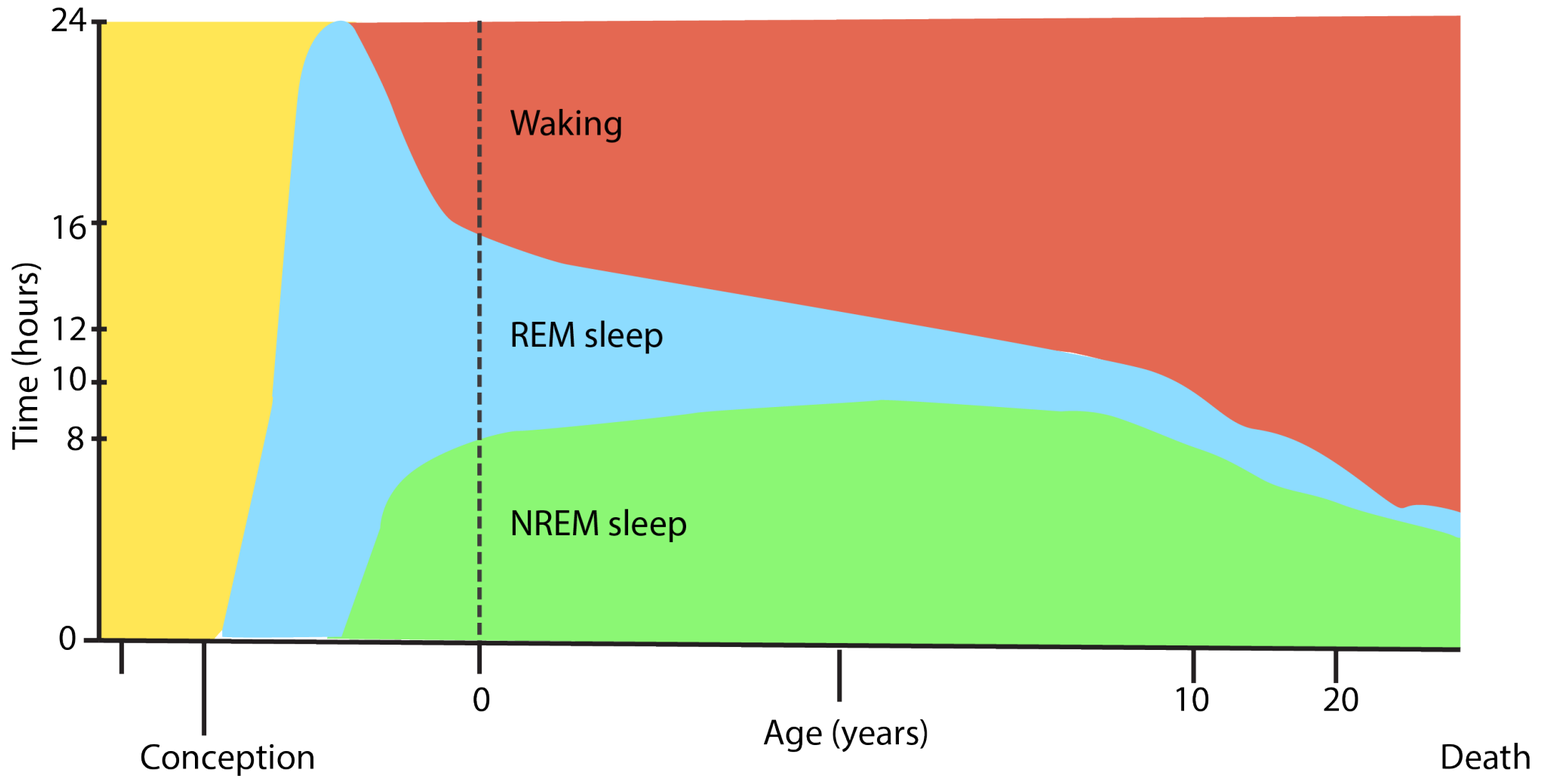
2. It is a virtual trainer. The act of dreaming has a major role in early development (stimulation and simulation) and throughout life (simulation for prediction) (Hobson, 2009).

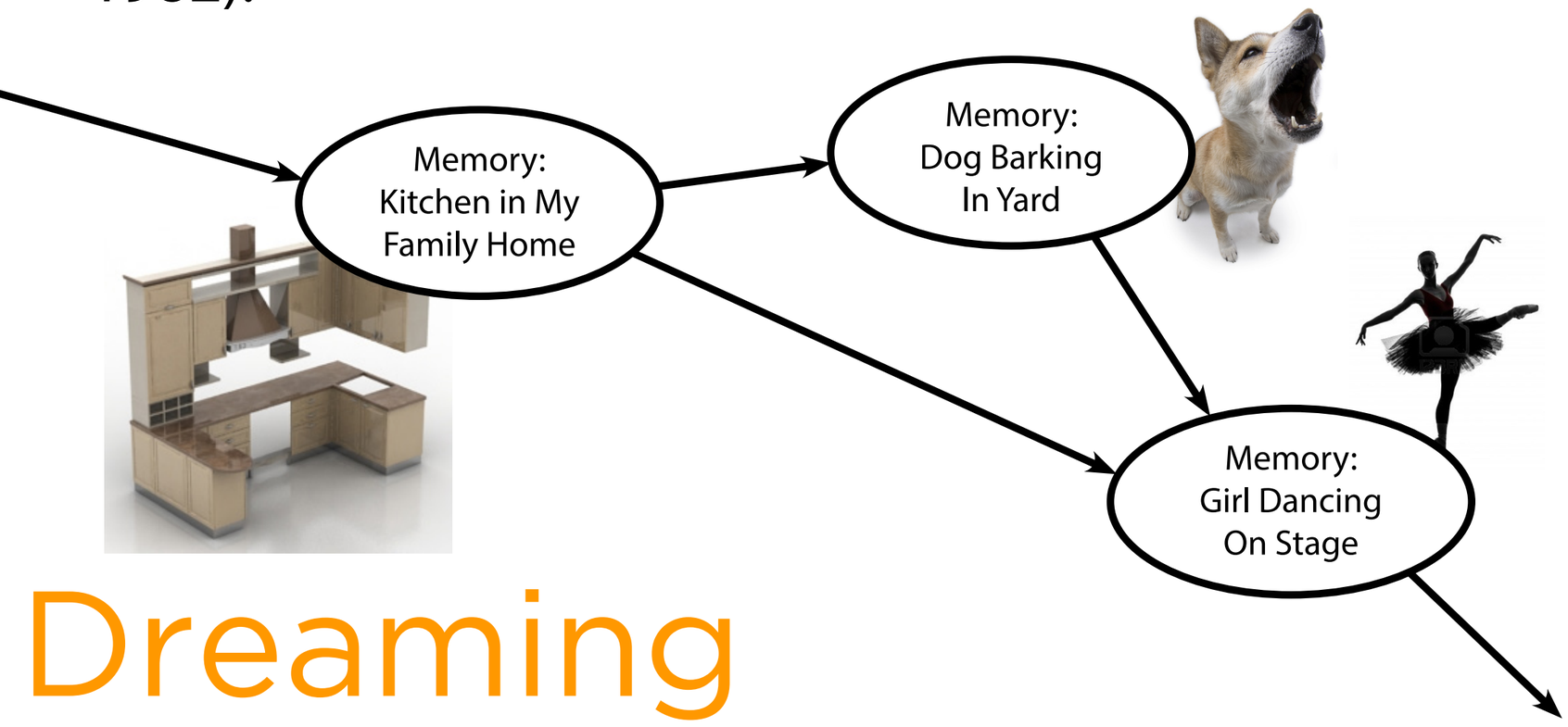


adapted from Hobson & Friston, 2012

Dreaming

Why Do We Dream?

1. It is our brain trying to make sense of it's own sleep-related activity.
1a. Dreams are simply left overs from a mind designed for a day job.
2. It is a virtual reality trainer. The act of dreaming has a major role in early development and throughout life.
3. Dreams result from the sleeper's mind attempting to organize unconsciously reactivated memories. It organizes those reactivations into a narrative (Foulkes, 1982).



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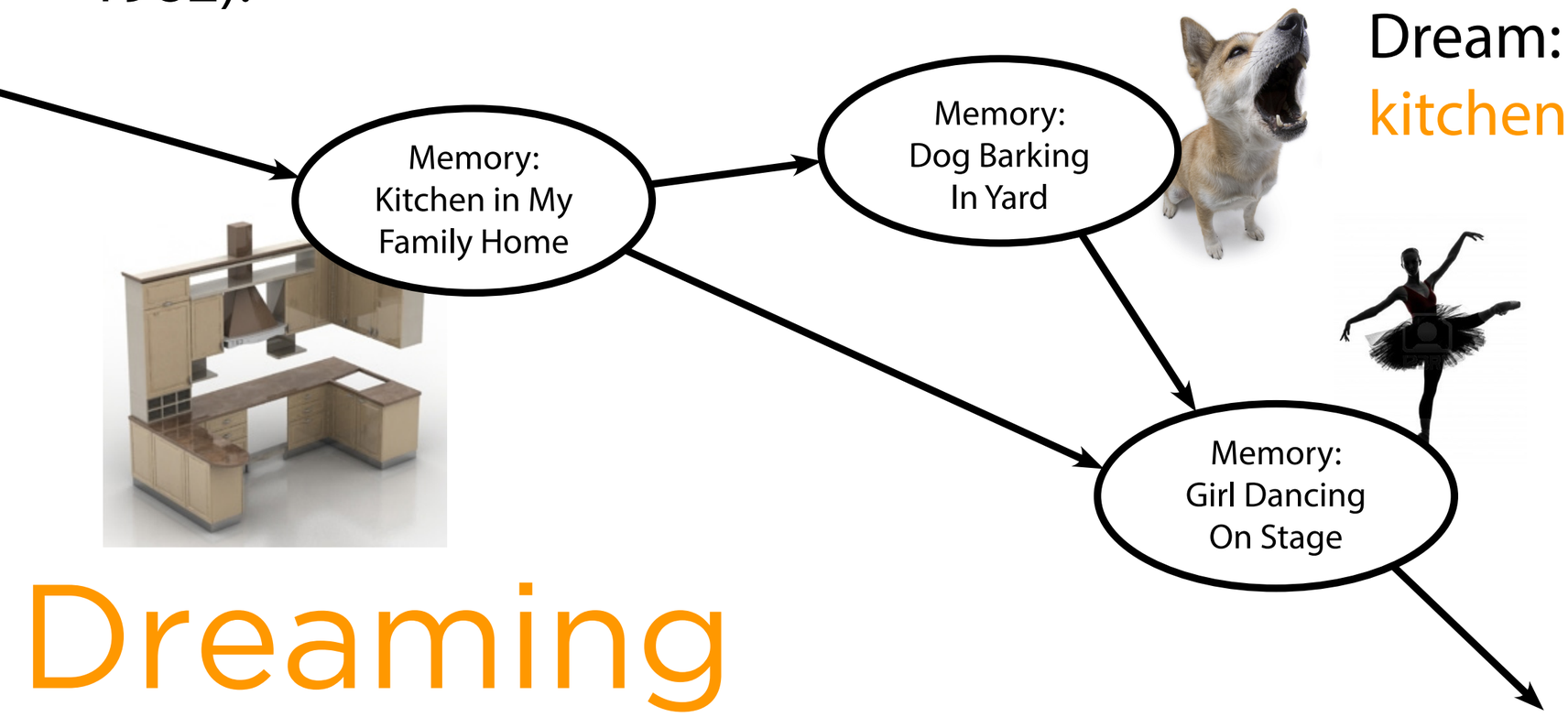

Dream: "My sister dancing in the kitchen while my dog barks at her."

Dreaming

Recent research has opened the possibility of recording the visual content of a dreamer's dreams while they are asleep.

Subject 2's 144th Dream; from Horikawa et al., 2013

Recording Dreams