Evaluating Alignment Approaches in Superimposed Time-series and Temporal Event-sequence Visualizations


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Holly Jimison


Sara Di Bartolomeo


Cody Dunne


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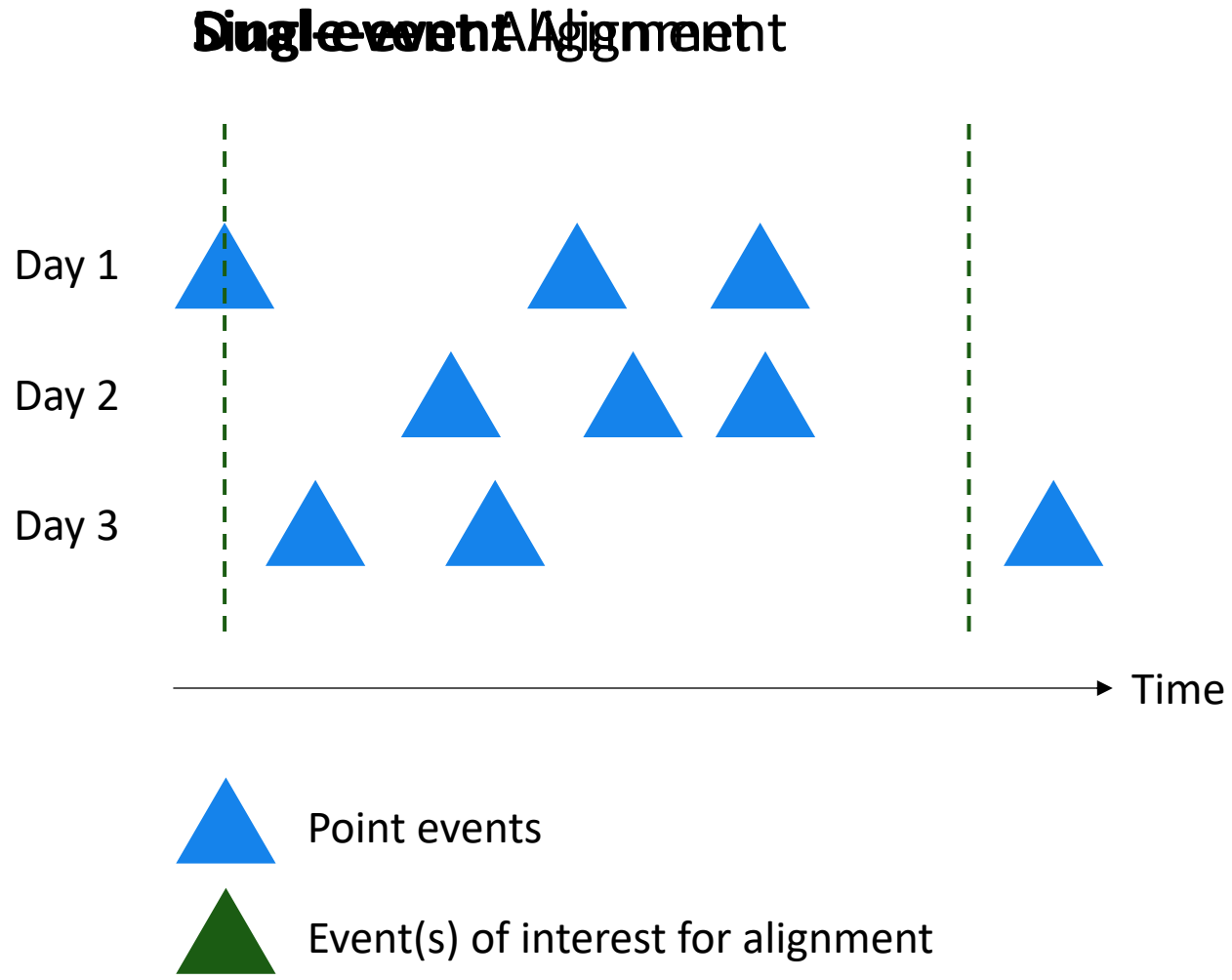
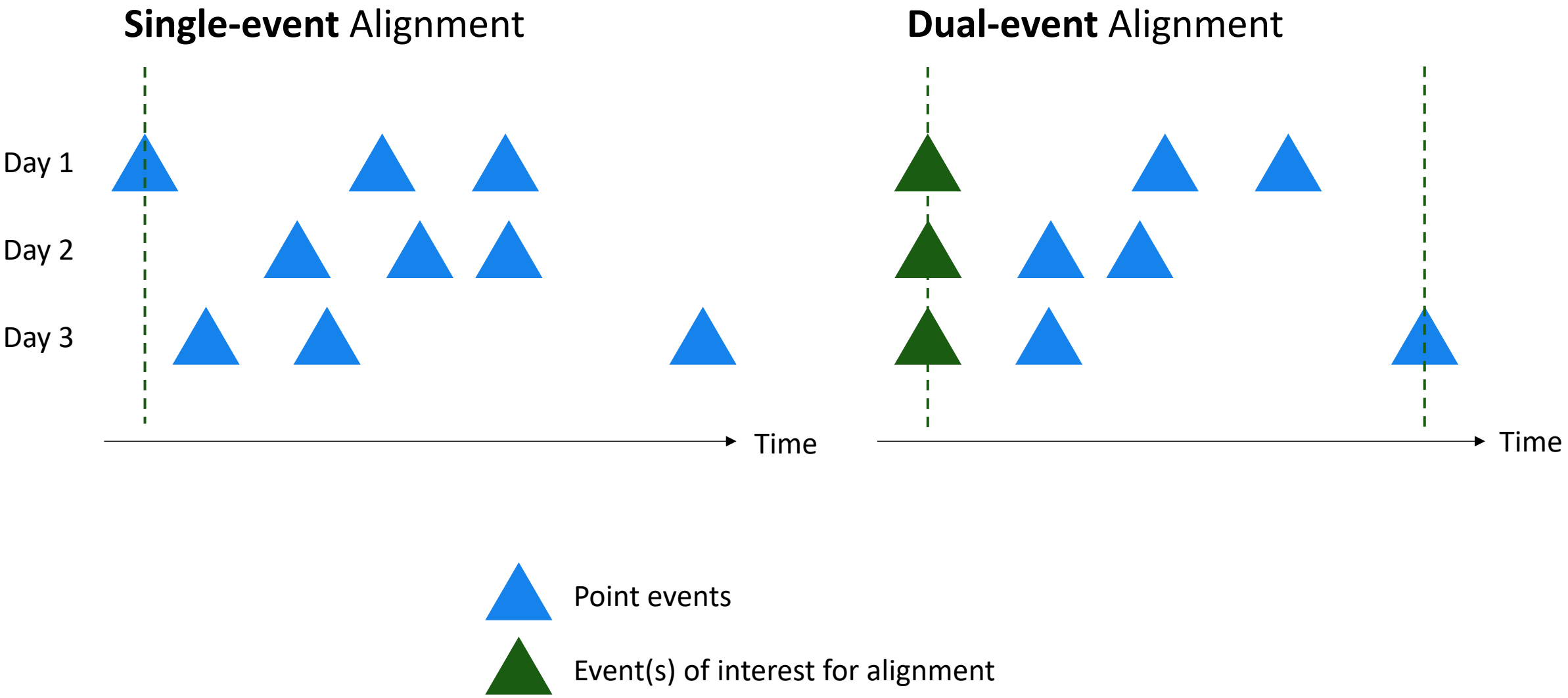
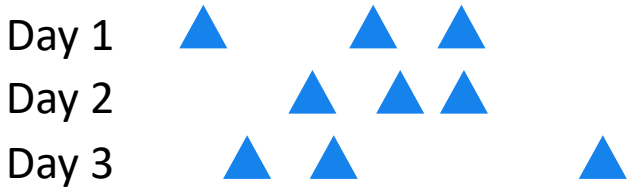
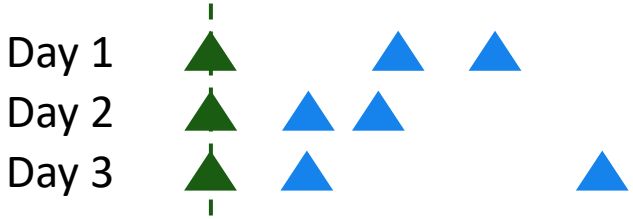

Single event Alignment
Day 1
Day 2
Day 3
Time
Point events
Event(s) of interest for alignment


Single-event Alignment
Day 1
Day 2
Day 3
Time
Dual-event Alignment
Time
Point events
Event(s) of interest for alignment

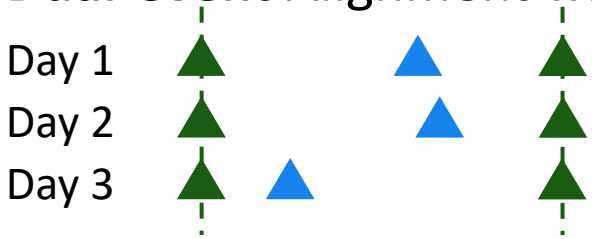
No Alignment



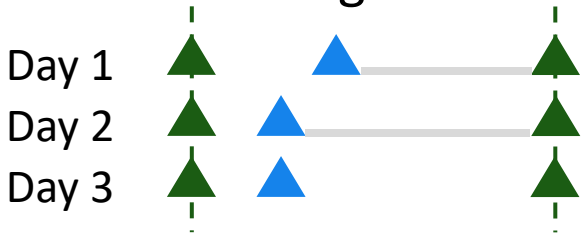
Single-event Alignment



Dual-event Alignment with ***Stretch*** time scaling



Dual-event Alignment with ***Left-justified*** time scaling



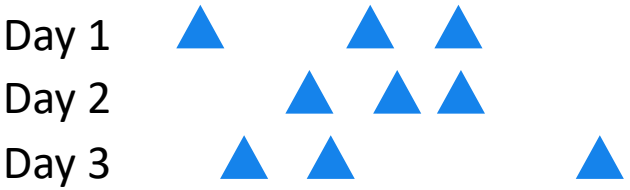
IDMVis

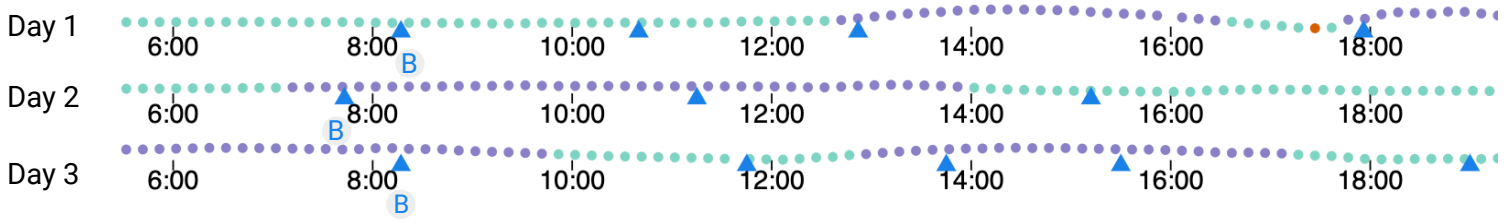
(Yixuan Zhang, Kartik Chanana, and Cody Dunne)

2018 InfoVis Design Study

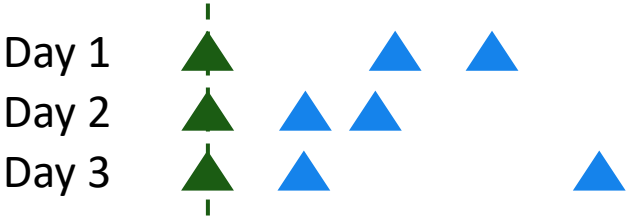
Type 1 diabetes data

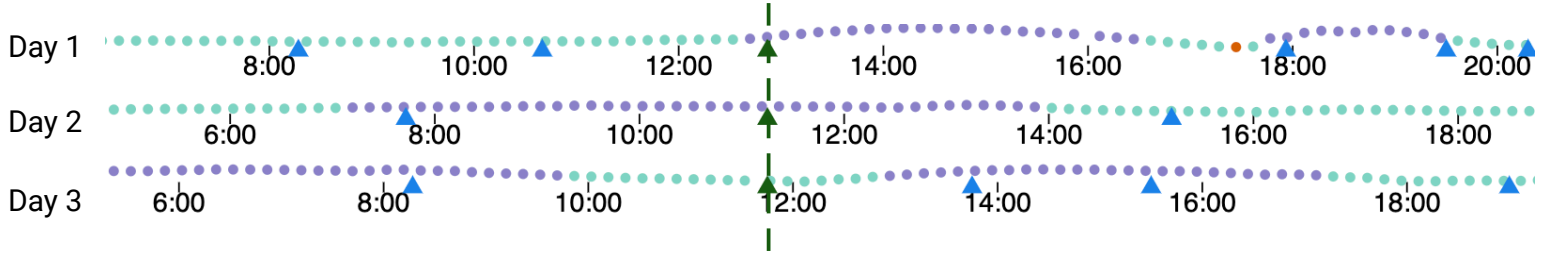
No Alignment



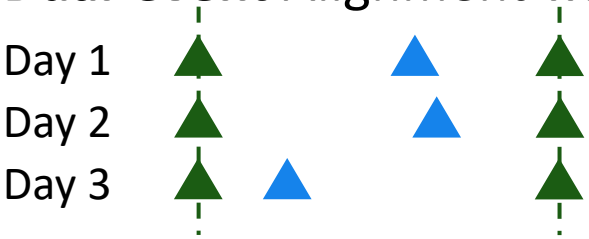


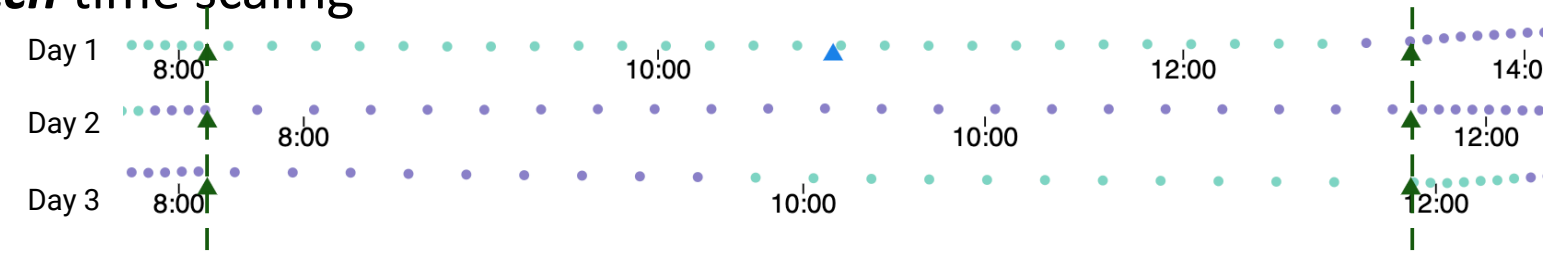
Single-event Alignment



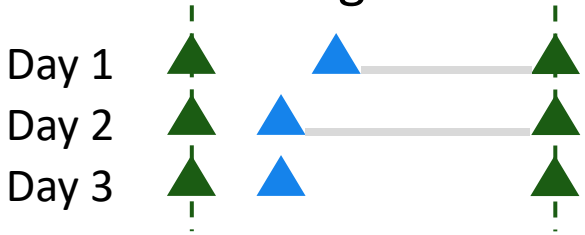


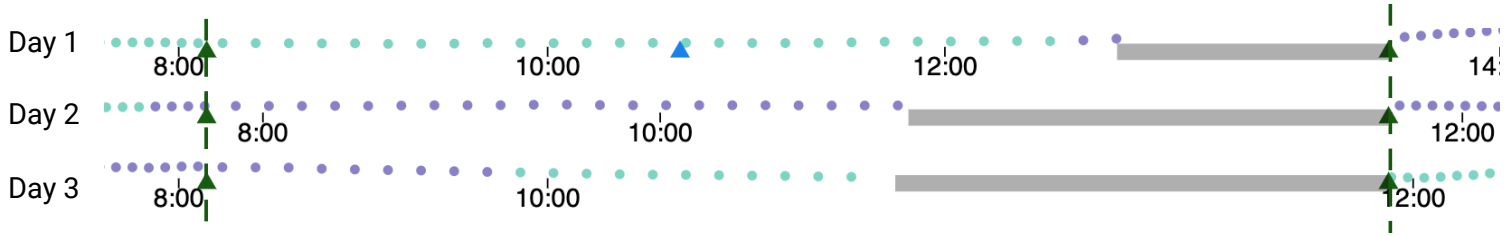
Dual-event Alignment with ***Stretch*** time scaling





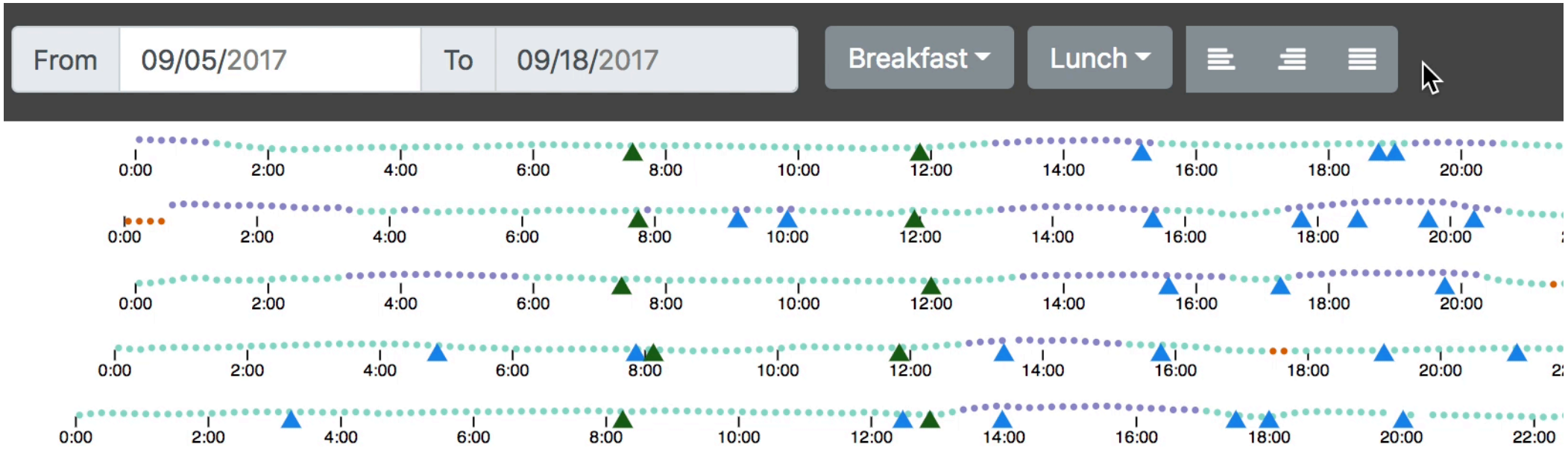
Dual-event Alignment with ***Left-justified*** time scaling





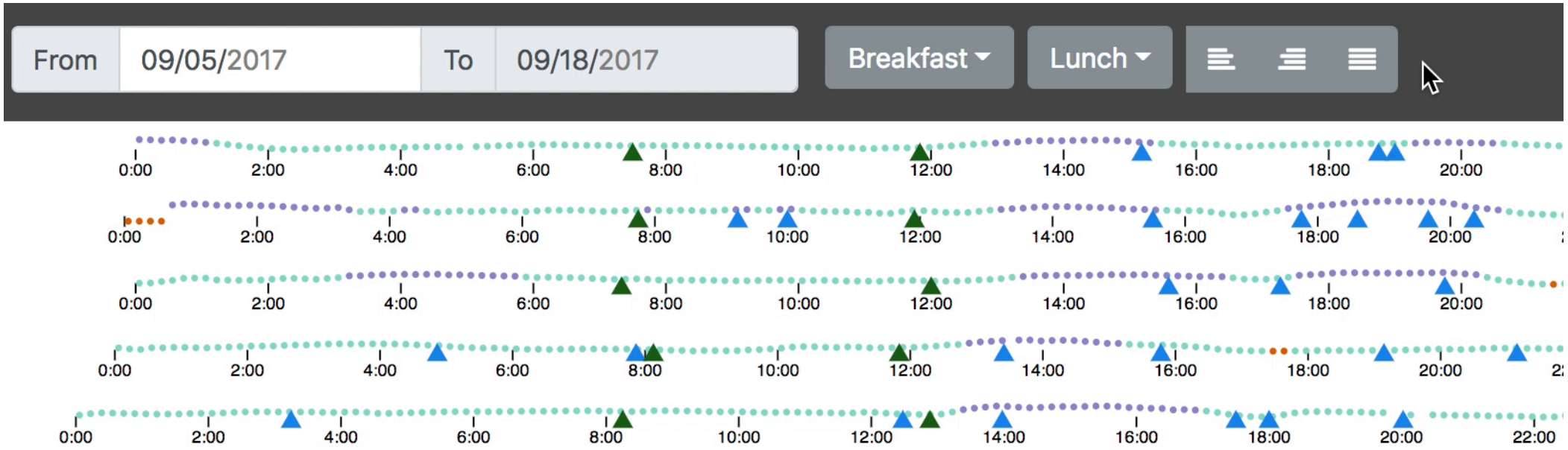
IDMVis 2018 InfoVis Design Study

Dual-event Alignment with *Stretch* time scaling

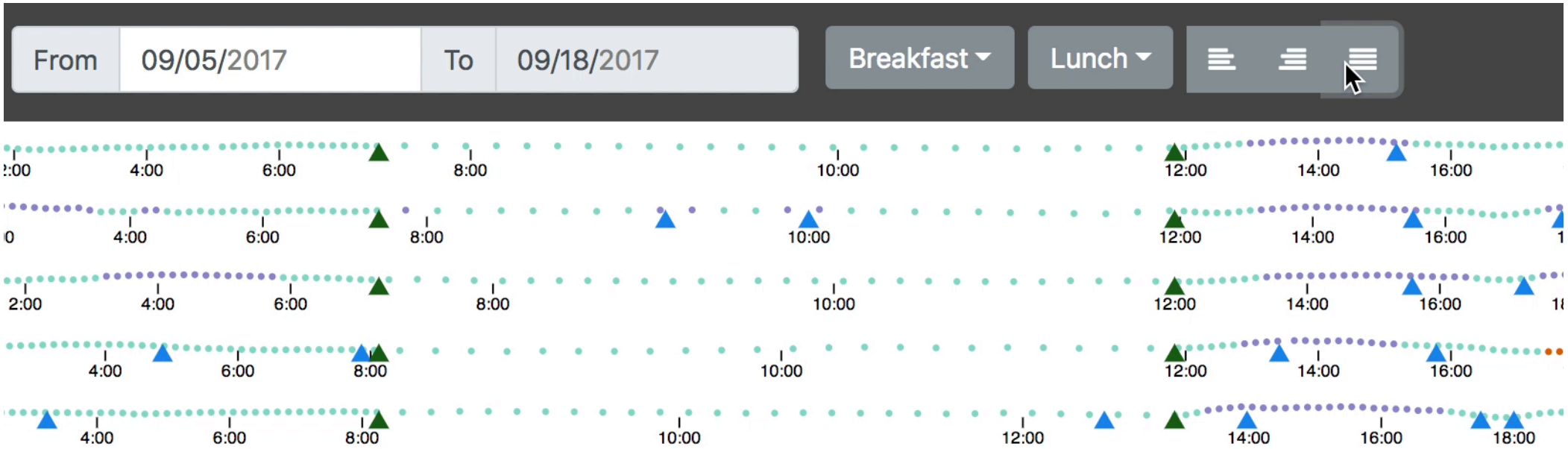


IDMVis 2018 InfoVis Design Study

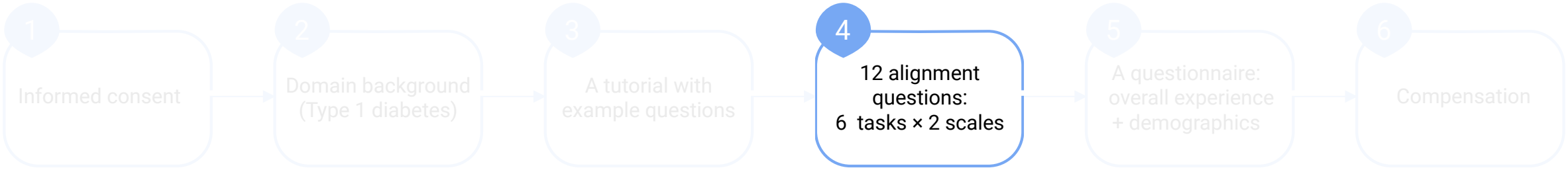
Dual-event Alignment with *Stretch* time scaling



Dual-event Alignment with *Left-justified* time scaling



Between-subjects experiment procedure



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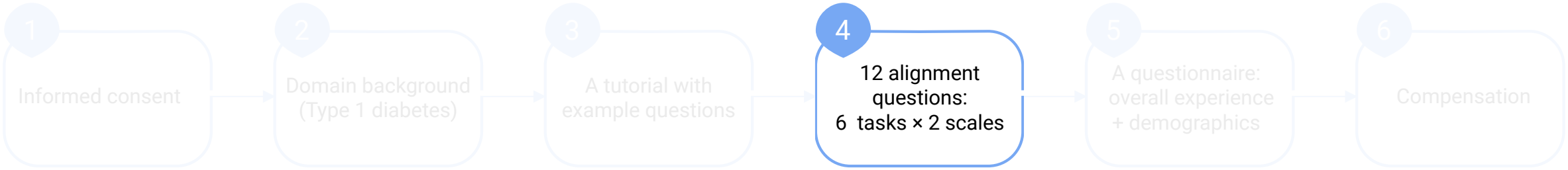
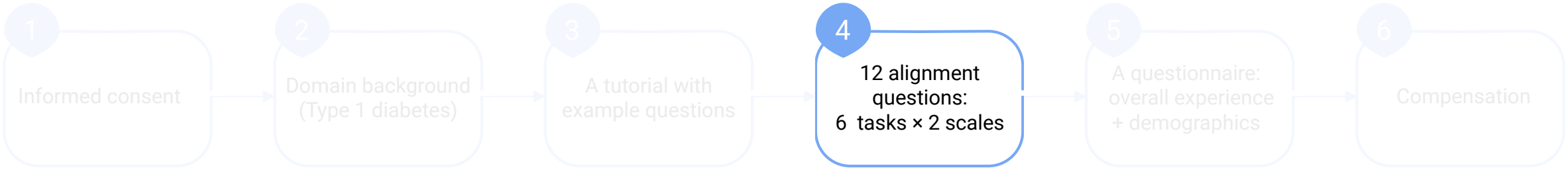


Precursor: event sequence that comes **before** an event of interest e.g., what happened **before** lunch

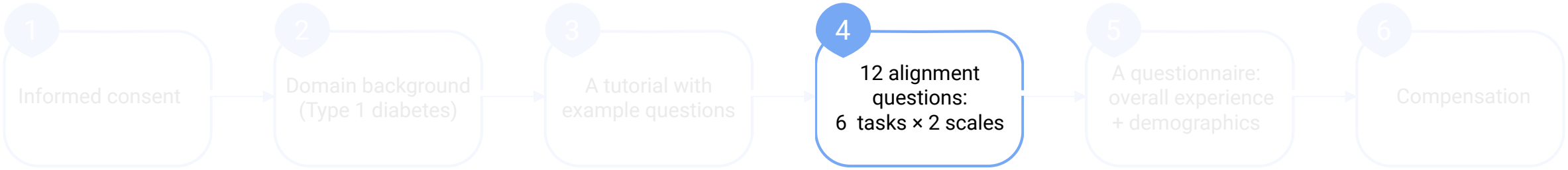
Between-subjects experiment procedure



Precursor: event sequence that comes **before** an event of interest — e.g., what happened **before** lunch

Aftereffect: event sequence that comes **after** an event of interest — e.g., what happened **after** lunch

Between-subjects experiment procedure



Precursor:	event sequence that comes **before** an event of interest	e.g., what happened **before** lunch
Aftereffect:	event sequence that comes **after** an event of interest	e.g., what happened **after** lunch
Intermediate:	event sequence that comes **between** two events of interest	e.g., what happened **between** lunch **and** dinner

For identifying precursor & aftereffect events

Task 1. How many days did the patient have only high blood glucose values within the 2 hours **BEFORE lunch**?

For identifying precursor & aftereffect events

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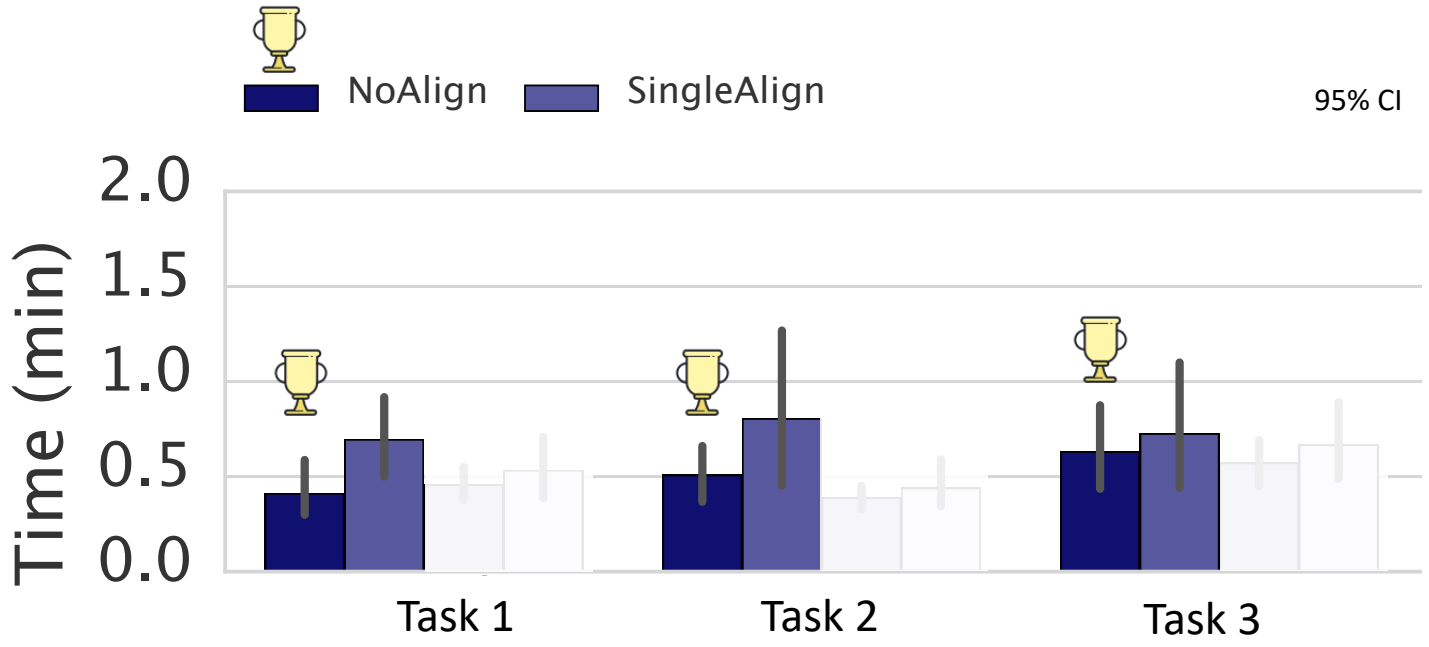
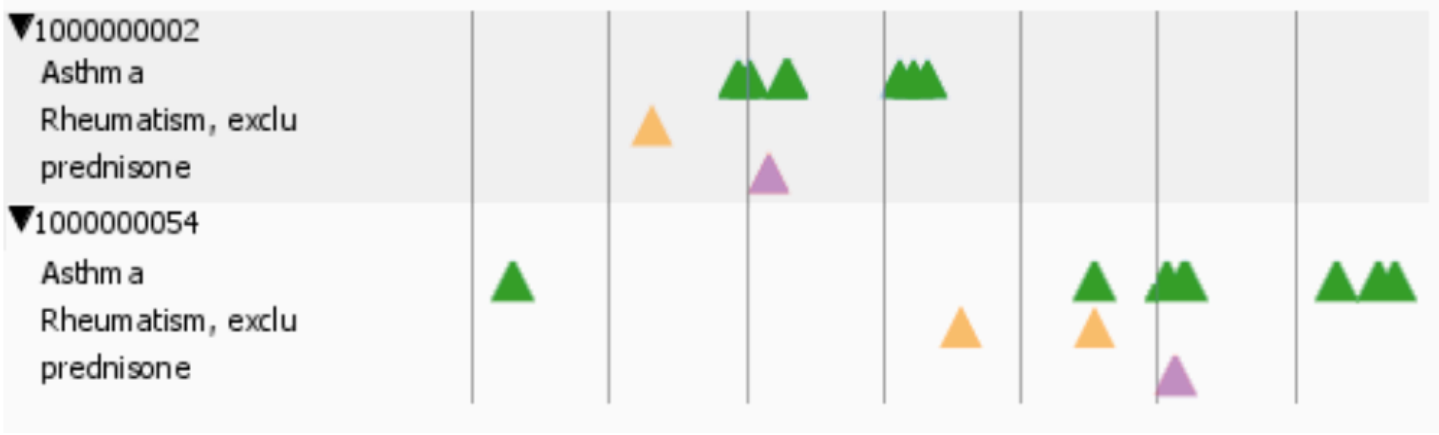
Using **SingleAlign** is slower than **NoAlign**



Lifelines2 (CHI 2008)

Dataset: synthetic data based on graduate students' milestone events (proposal, defense, etc.)



point events

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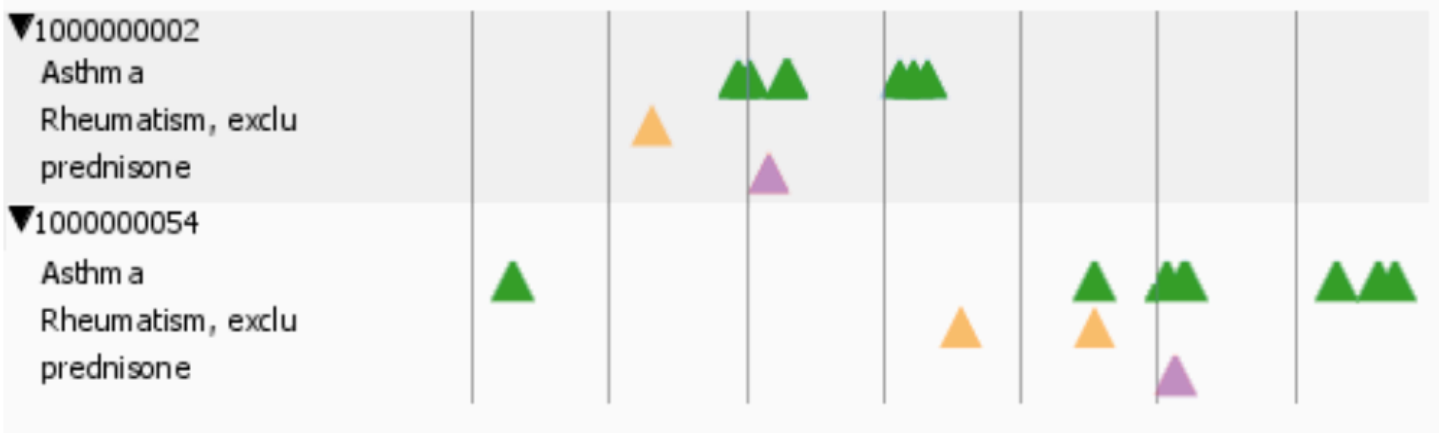
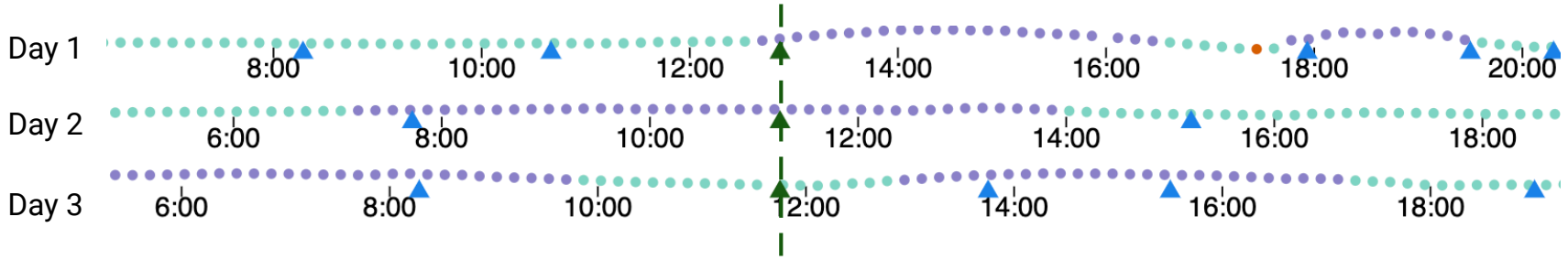


point events

IDMVis (2018 InfoVis)

Dataset: de-identified Type 1 diabetes treatment data



IDMVis (2018 InfoVis)
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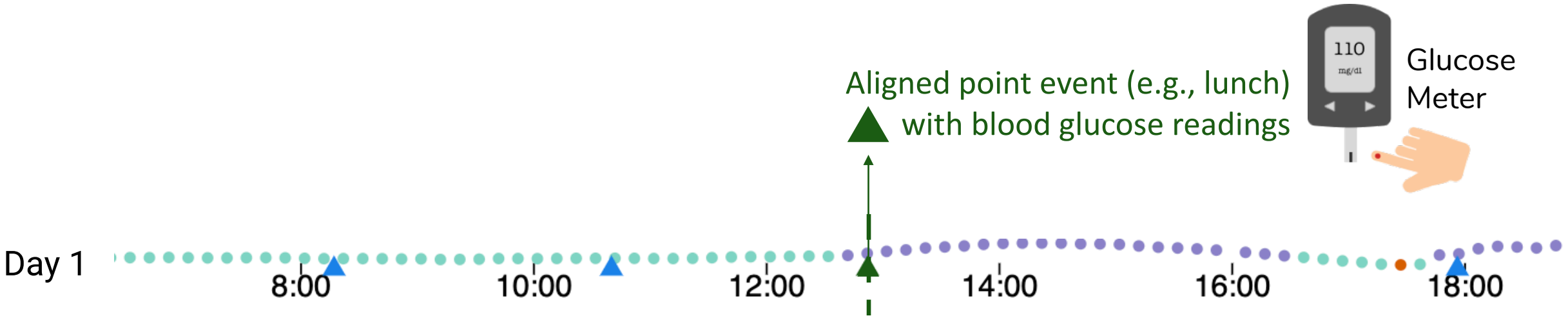

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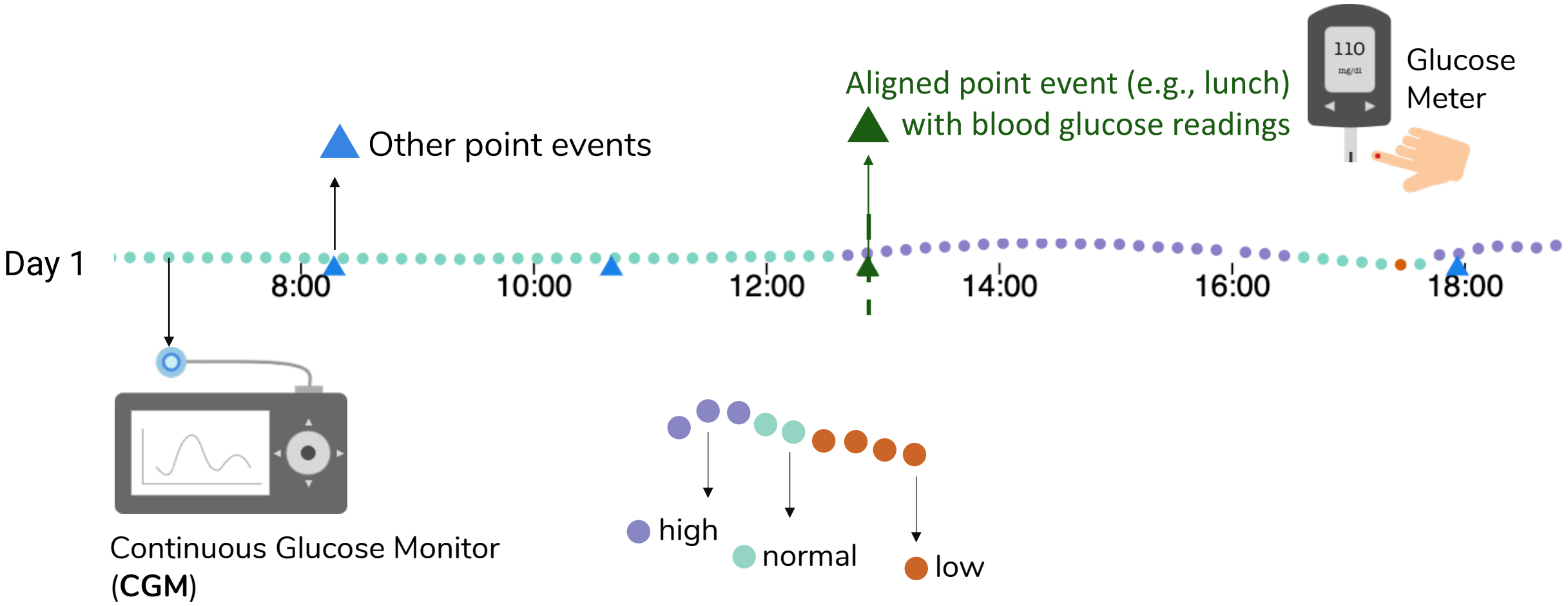
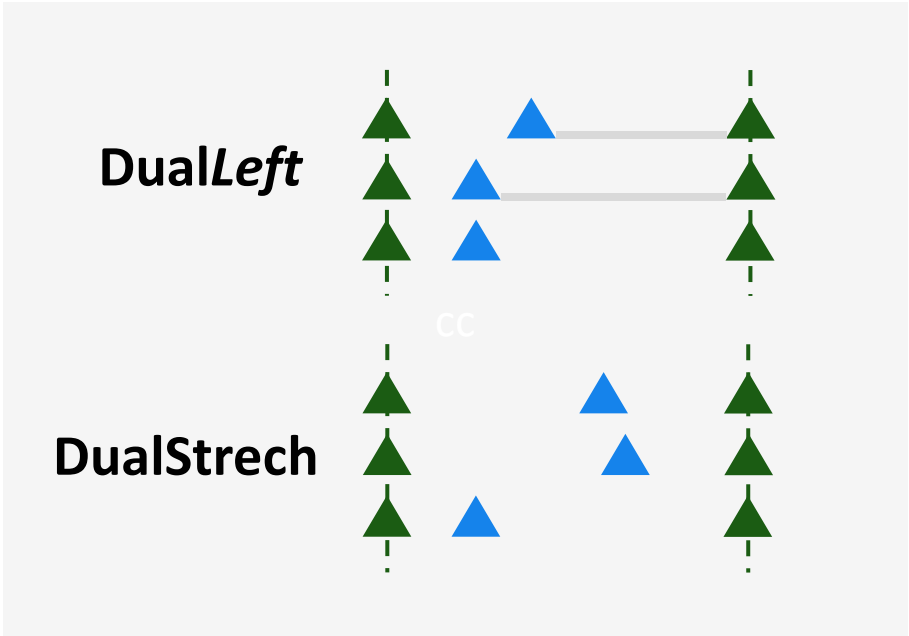


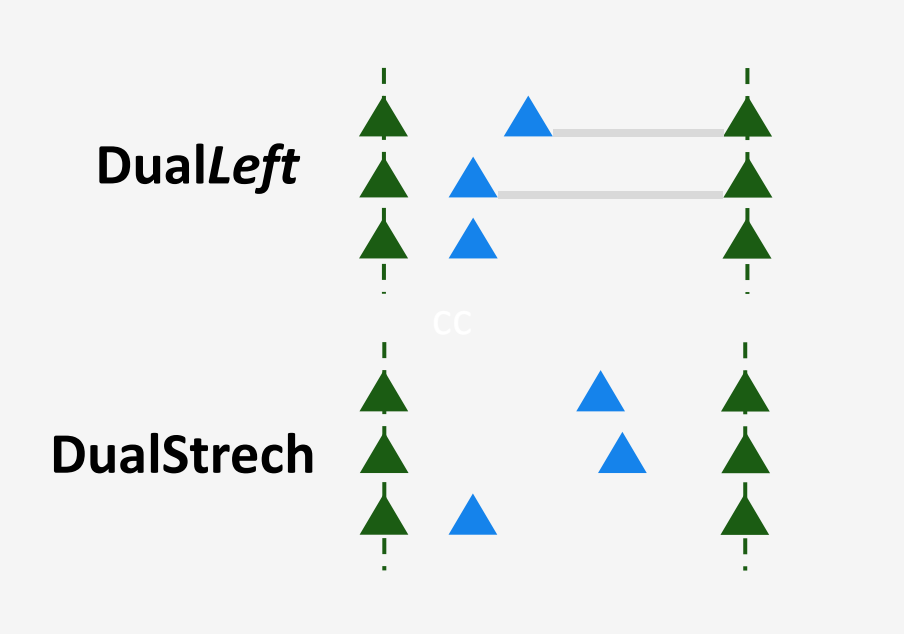
Dual-event alignment to understand the **sequence of intermediate events**:

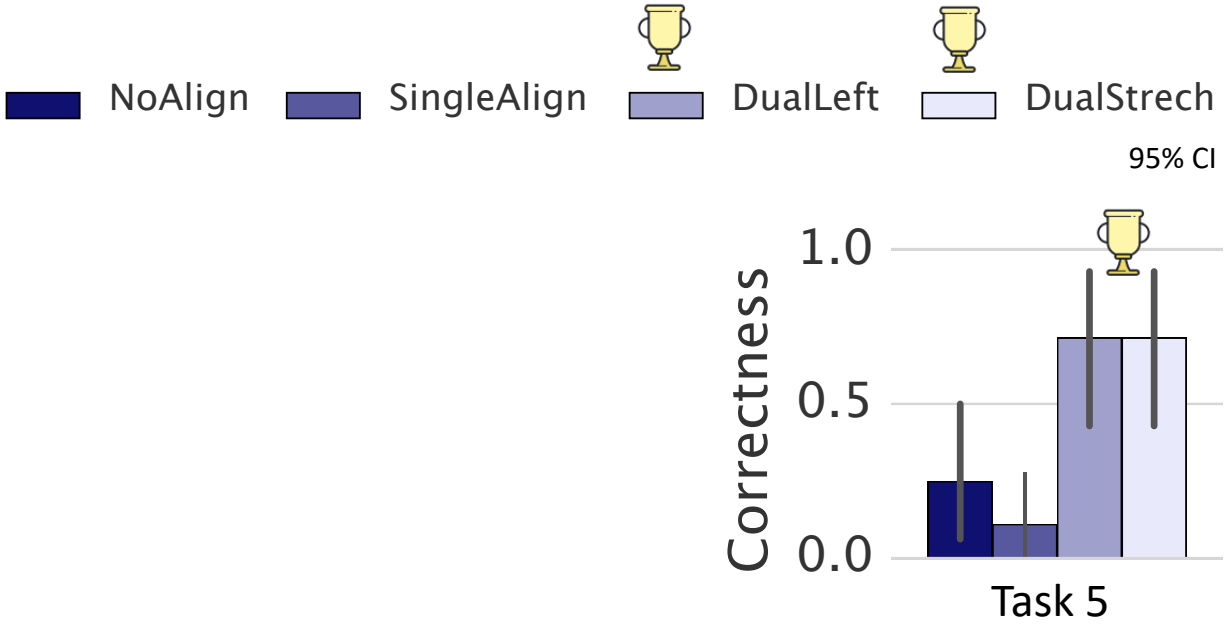
Task 5. How many days did the patient have at least three consecutive high blood glucose values **BETWEEN breakfast and lunch**?



Dual-event alignment to understand the **sequence of intermediate events**: **more correctly**

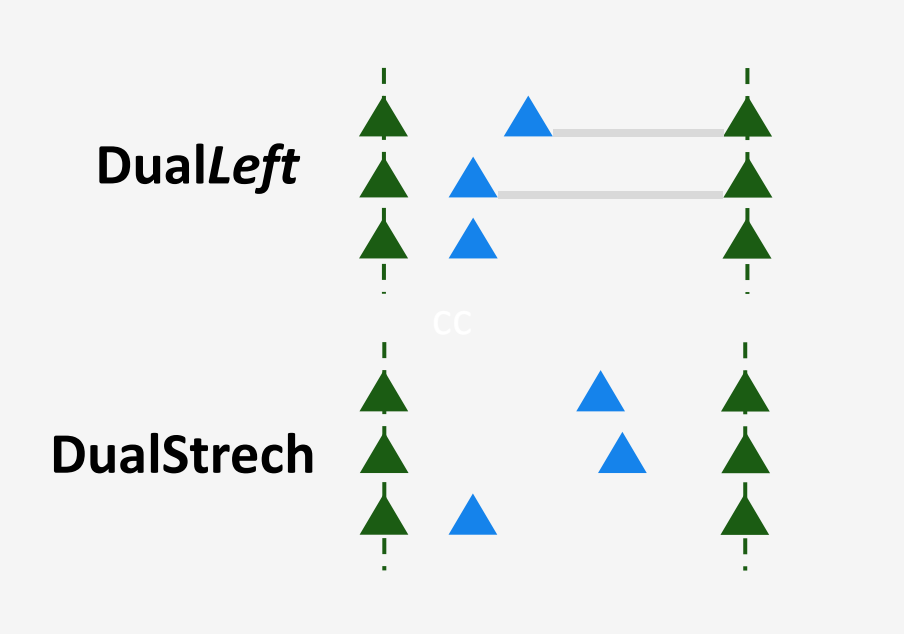
Task 5. How many days did the patient have at least three consecutive high blood glucose values **BETWEEN breakfast and lunch**?

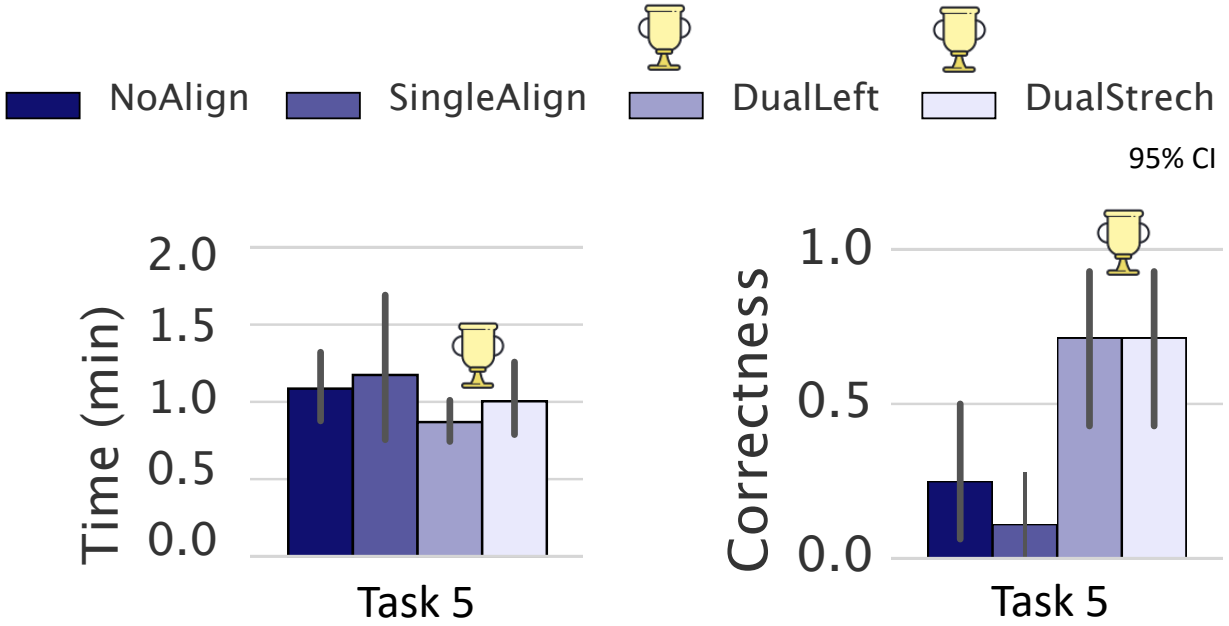




Dual-event alignment to understand the **sequence of intermediate events**: **more correctly & faster**

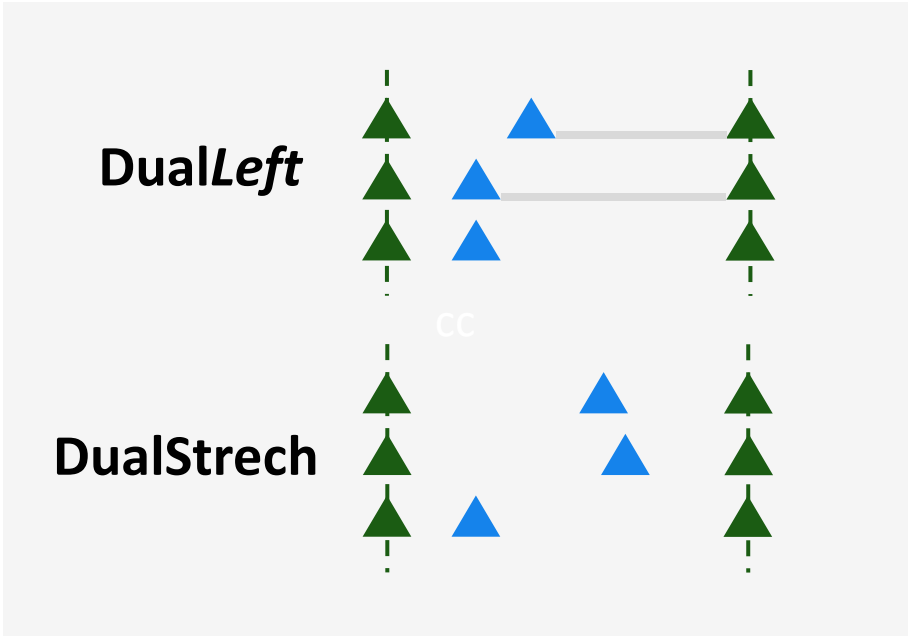
Task 5. How many days did the patient have at least three consecutive high blood glucose values **BETWEEN breakfast and lunch**?





Dual-event alignment: **not** for identifying the **duration between events**

Task 4. Among the days shown, what is the length of the longest gap **BETWEEN lunch and dinner** (in hours)?



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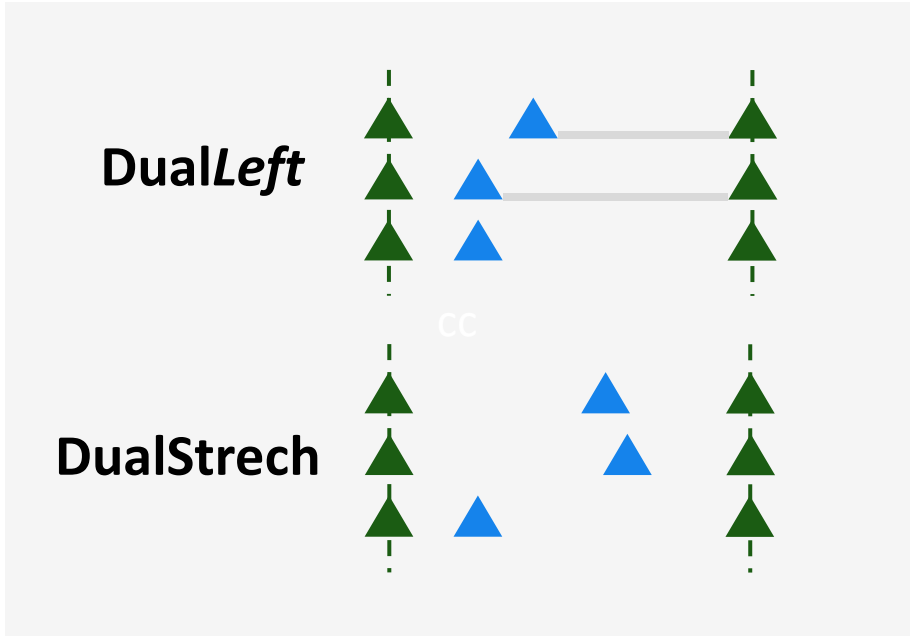
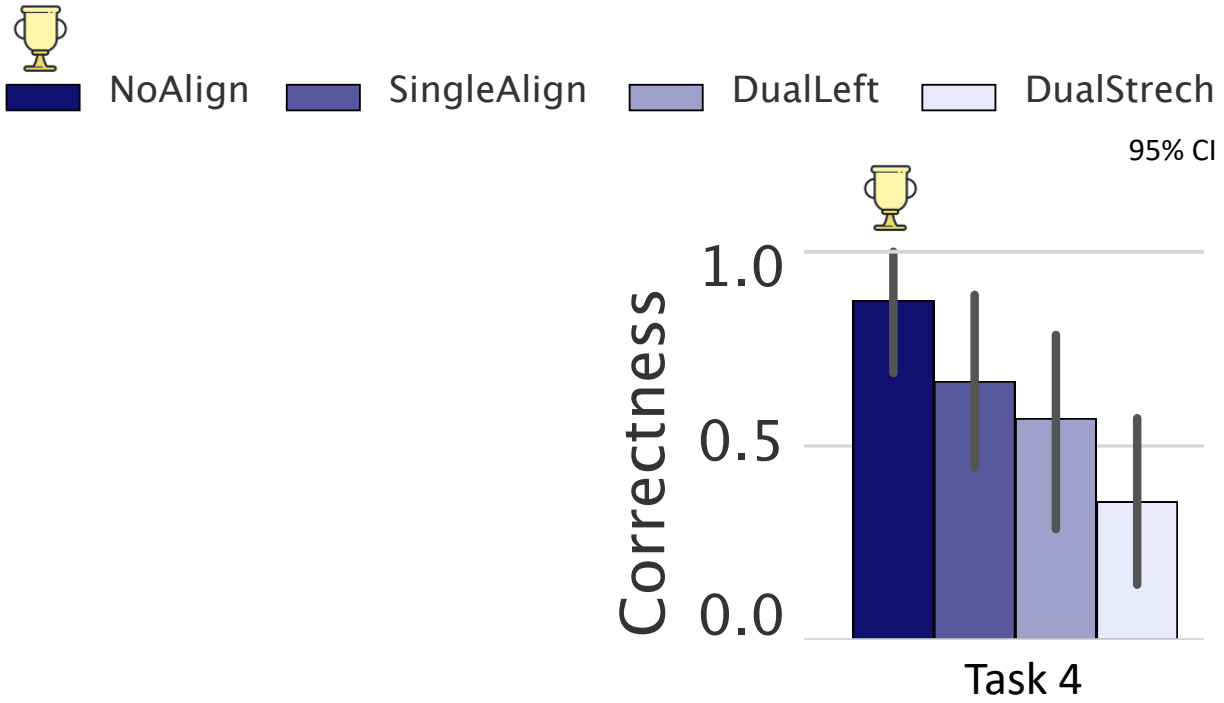
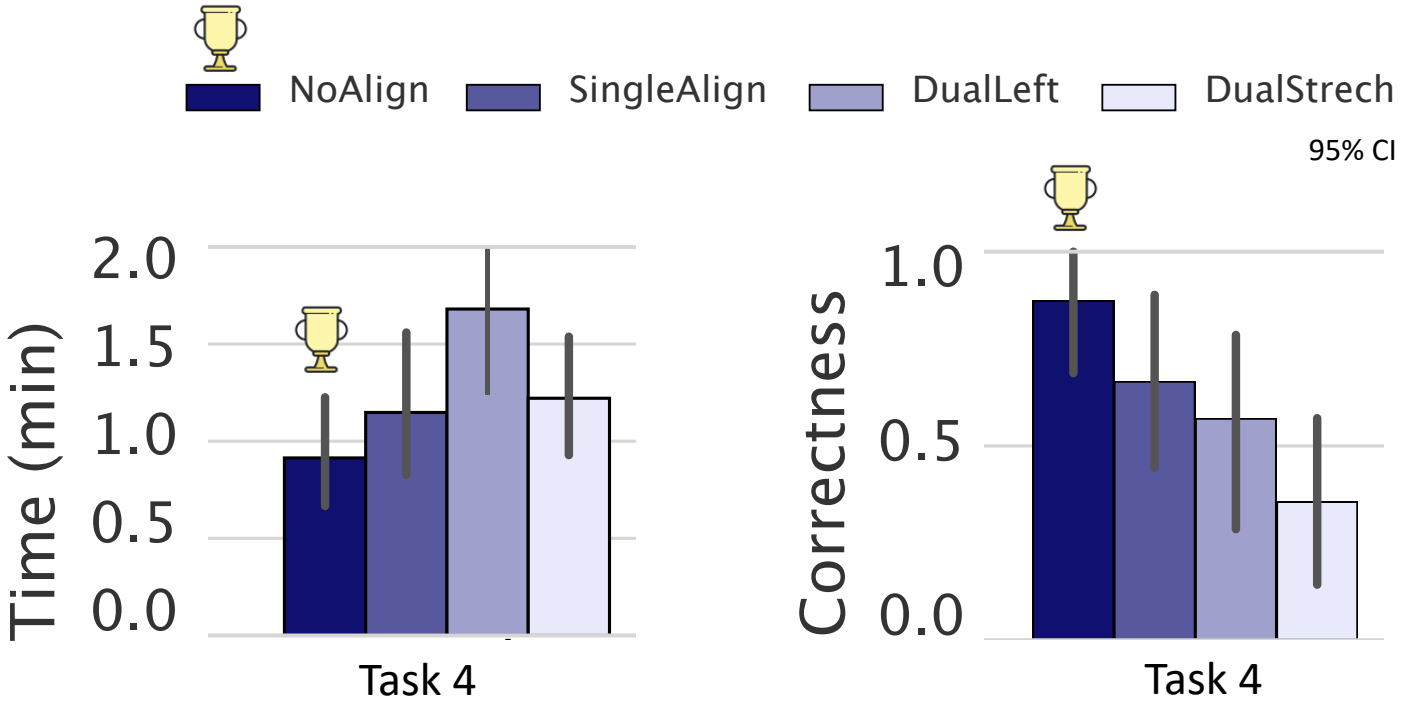




Dual-event alignment: **not** for identifying the **duration between events:**

NoAlign wins

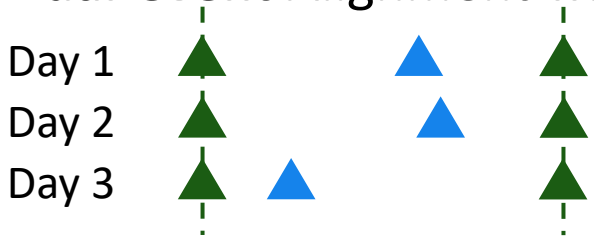
Task 4. Among the days shown, what is the length of the longest gap **BETWEEN lunch and dinner** (in hours)?



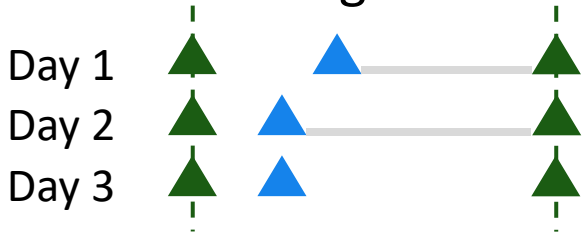
Reflections & Take-aways

Consider using dual-event alignment for exploring intermediate events, but not identifying the duration between events.

Dual-event Alignment with ***Stretch*** time scaling



Dual-event Alignment with ***Left-justified*** time scaling



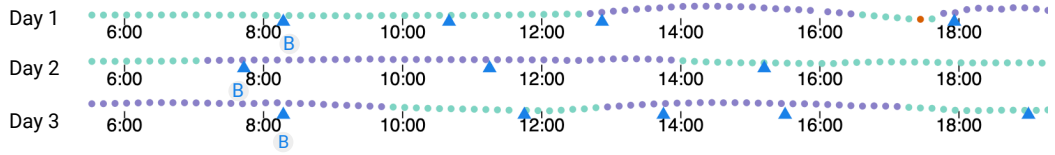
Reflections & Take-aways

Consider the nature of the composite visualizations when applying alignment techniques

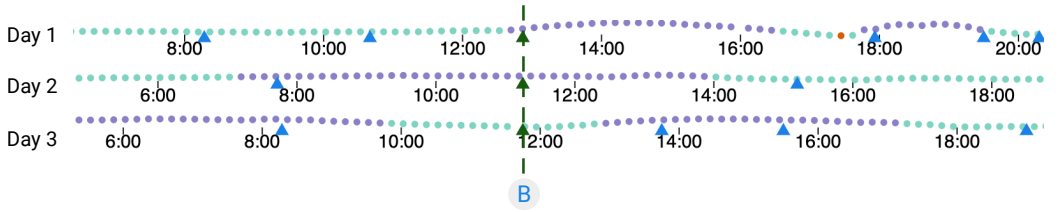
National Science Foundation CRII award no. 175590

bit.ly/AlignmentStudy

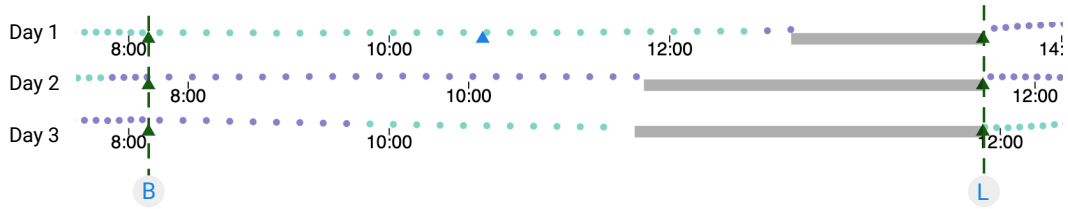
No alignment (NoAlign)



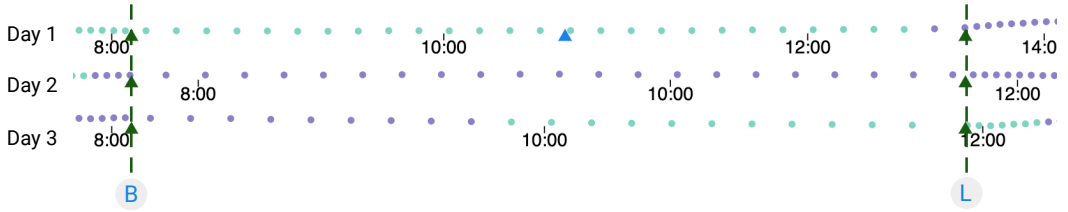
Single-event alignment (SingleAlign)



Dual-event alignment with left justification (DualLeft)



Dual-event alignment with stretch justification (DualStretch)

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