

# Aligning Timeframes Only Reduces the Count by as Much as You Aligned [F010]

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Aligning four timeframes cuts the count to 0.3683 of itself and multiplying three conditions cuts it to 0.3413, while the directional information does not rise — and what looks like "alignment makes it significant" is the overlap: removing it drops the median daily  $t$  from 2.4643 to 0.5923 and the significant cells from 4 of 4 to 0 of 4

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## Abstract

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This paper asks whether adding conditions adds information, or only removes count — the answer is that it only removes count. It claims neither a new mathematical theorem nor a new law.

First, moving the number of aligned timeframes  $k$  from 1 to 4 across five-minute, fifteen-minute, one-hour and four-hour bars cuts the count from **17,841** to **6,798** (USDJPY), a median ratio across the four series of **0.3683**. Over the same move, the median directional information runs **+0.2548**, **+0.4347**, **+0.8606**, **−0.2449 pips** — **not monotone** (Section 3).

Second, the same happens when three moving averages are required to line up (conditions multiplied 1, 2, 3): the count falls to **0.3413** of itself. The median change in directional information is **−1.3877 pips**, **negative in all four series** (Section 4).

Third, and this is the core of the paper, ⚠ at  $k = 4$  the median absolute daily  $t$  reaches **2.4643** and the significant cells become **4 of 4**. Chance gives about **0.2**, so this reads as "alignment works". **But with twenty-four bars of look-forward, neighbouring observations overlap by twenty-three bars**. Taking one observation only after the previous one has finished leaves **0.1012** of the count, a median daily  $t$  of **0.5923**, and **0 of 4** significant cells (Section 5).

Fourth, the same holds for the perfect order. With the overlap the median daily  $t$  is **5.2377**; removing it gives **0.5286**. **And the sign reverses in 2 of the 4 series** for the aligned family (Section 5).

Fifth, the  $k$  that was best in the selection period was also best in the evaluation period in **1 of 4 series**. Chance gives **1.0**, so **the selection-period ordering does not carry over** (Section 6).

Sixth, building one synthetic path from independent normal increments down to the movement inside each bar, and aggregating it into the four timeframes, gives a  $k = 4$  count ratio of **0.3895** to **0.3918**. **That is higher than the measured 0.3630 to 0.3810**. Alignment is not a property of the market but a consequence of **looking at one price series at four resolutions** (Section 7).

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**Scope of this paper (scope note): No new mathematical theorem and no new law is claimed** — moving averages, multi-timeframe alignment, random walks, and the fact that overlapping observations inflate  $t$  are all known. **No particular product or proponent is discussed** — no real course, author, or vendor is the subject here, and none is named. What is treated is the public practice itself. **Trading is not discussed** — what is measured is counts and directional information, not trading performance including commissions, fills and money management. **The scope is intraday and a small number of instruments** — four series, six years, on a one-hour base lattice. Monthly time-series momentum (dozens of markets, holding one to twelve months) is documented in the literature, and this paper does not contradict it. **One combination of timeframes is fixed** — five-minute, fifteen-minute, one-hour and four-hour, with SMA(20). Other combinations give other figures (Section 9). **"Aligned" is defined as agreement in sign** — agreement in slope or in ordering is not treated. **No forecast is claimed**. **Relation to earlier papers:** this series always reports, alongside a rate or a  $t$ , what it would be by chance. F004 showed that removing the overlap drops the significant cells from 10 of 16 to 2 of 16 — this paper applies the same move to the practice of adding conditions. What is added here is **placing the fall in count beside what independence would give, building a baseline from one path aggregated into four timeframes, and putting the daily  $t$  and the sign before and after the overlap into one table**.

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## 1. Notation and the question

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There is a practice of aligning the direction of a higher and a lower timeframe before entering, and another of waiting for three moving averages to line up.

| Practice                  | A common form                                                   | What is said about it             |
|---------------------------|-----------------------------------------------------------------|-----------------------------------|
| Multi-timeframe alignment | four-hour up, one-hour up, then buy the fifteen-minute pullback | do not fight the higher timeframe |
| Alignment of order        | short, medium and long averages lined up in order               | evidence of a strong trend        |
| Adding conditions         | multiply the two above together                                 | the accuracy goes up              |

**Observation 1.1:** ⚠️ **adding a condition necessarily reduces the count.** That says nothing about the market. It is a property of multiplication, independent of the merits of the practice.

**Observation 1.2:** ⚠️ **and a smaller count makes the win rate move more easily.** In a small sample both good and bad figures appear more readily. A report that "the win rate is high when aligned" **cannot be read unless the win rate when not aligned, the count, and what chance would give are reported beside it.**

**Observation 1.3: the question settles by placing three things alongside.** One is **the fall in count** — what independence would give. Two is **the directional information** — did it concentrate by as much as the count fell. Three is **the overlap** — is the same event being counted many times.

**Question:** when a condition is added, does information rise, or does only the count fall?

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## 2. Writing the quantity and the design in advance

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**Design (declared before running and unchanged at run time)**

| Item                    | Decision                                                                                                                               |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Family A                | the sign of the close against SMA(20) on five-minute, fifteen-minute, one-hour and four-hour bars                                      |
| k in Family A           | the number aligned. Trade in that direction when the first k of them all agree                                                         |
| Family B                | SMA(5), SMA(20), SMA(80) on one-hour bars. Condition 1 is 5 above 20, condition 2 adds 20 above 80, condition 3 adds the close above 5 |
| Base bars               | one hour, mid price, completed bars only                                                                                               |
| Horizon                 | $h = 24$ (twenty-four hours)                                                                                                           |
| Directional information | the mean of the signal's sign times the price move over the next 24 bars (pips)                                                        |
| Instruments             | USDJPY, EURUSD, GBPUSD, XAUUSD                                                                                                         |
| Period                  | 2019–2024. Selection 2019–2021, evaluation 2022–2024                                                                                   |

**Observation 2.1:** ⚠️ **only completed higher-timeframe bars are used.** Reading the four-hour timeframe at a one-hour timestamp  $t$  using the four-hour bar that contains  $t$  **would look up to four hours into the future.** Only bars whose end is at or before  $t$  are used.

**Observation 2.2:** ⚠️ **with  $h = 24$  bars of look-forward, neighbouring observations overlap by twenty-three bars.** Daily clustering folds only the overlap **within a day**; the overlap across days remains. Section 5 removes it.

**Observation 2.3:** ⚠️ **"aligned" is defined as agreement in sign.** Agreement in slope, or in ordering, is a different definition. Family B is one such.

The bar counts are, for USDJPY, **438,283** five-minute, **146,125** fifteen-minute, **36,534** one-hour and **9,640** four-hour; for EURUSD **438,505**, **146,202**, **36,554**, **9,648**; for GBPUSD **438,199**, **146,127**, **36,535**, **9,644**; and for XAUUSD **418,478**, **139,501**, **34,892**, **9,442**.

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### 3. Family A — moving the number aligned from 1 to 4

**Calculation 3.1** Count and directional information by k (evaluation period)

| Instrument | k | Count  | D (pips) | Dd (daily mean) | Daily t | Days | Per day | Spread |
|------------|---|--------|----------|-----------------|---------|------|---------|--------|
| USDJPY     | 1 | 17,841 | 1.4086   | 1.8664          | 2.05    | 935  | 24.0    | 0.60   |
| USDJPY     | 2 | 13,626 | 2.7307   | 3.0784          | 2.33    | 928  | 17.0    | 0.60   |
| USDJPY     | 3 | 9,952  | 3.0821   | 2.0426          | 1.07    | 906  | 12.0    | 0.60   |
| USDJPY     | 4 | 6,798  | 2.4546   | − 5.4733        | − 2.15  | 873  | 8.0     | 0.60   |
| EURUSD     | 1 | 17,867 | − 0.6399 | − 0.2000        | − 0.38  | 936  | 24.0    | 0.30   |
| EURUSD     | 2 | 13,658 | − 1.0408 | − 0.1921        | − 0.27  | 926  | 17.0    | 0.30   |
| EURUSD     | 3 | 9,756  | − 0.4116 | 0.0633          | 0.06    | 898  | 12.0    | 0.30   |
| EURUSD     | 4 | 6,485  | − 0.8412 | − 3.4725        | − 2.56  | 860  | 8.0     | 0.30   |
| GBPUSD     | 1 | 17,850 | 0.1094   | 0.5404          | 0.76    | 935  | 24.0    | 0.90   |
| GBPUSD     | 2 | 13,728 | − 0.1583 | 0.8609          | 0.90    | 923  | 17.0    | 0.90   |
| GBPUSD     | 3 | 9,863  | − 0.0066 | − 0.0130        | − 0.01  | 885  | 12.0    | 0.90   |
| GBPUSD     | 4 | 6,584  | 0.3513   | − 4.4598        | − 2.37  | 862  | 8.0     | 0.90   |
| XAUUSD     | 1 | 17,471 | 0.4002   | 0.4684          | 0.19    | 918  | 23.0    | 3.57   |
| XAUUSD     | 2 | 13,432 | 1.0277   | 0.3503          | 0.12    | 896  | 17.0    | 3.57   |
| XAUUSD     | 3 | 9,704  | 1.7277   | − 1.8574        | − 0.46  | 863  | 12.0    | 3.56   |
| XAUUSD     | 4 | 6,424  | − 1.5865 | − 18.4721       | − 3.57  | 832  | 8.0     | 3.58   |

### Calculation 3.2 How the count falls

| Instrument | k=1    | k=2    | k=3   | k=4   | k=4 ÷ k=1 | If independent |
|------------|--------|--------|-------|-------|-----------|----------------|
| USDJPY     | 17,841 | 13,626 | 9,952 | 6,798 | 0.3810    | 0.1250         |
| EURUSD     | 17,867 | 13,658 | 9,756 | 6,485 | 0.3630    | 0.1250         |
| GBPUSD     | 17,850 | 13,728 | 9,863 | 6,584 | 0.3689    | 0.1250         |
| XAUUSD     | 17,471 | 13,432 | 9,704 | 6,424 | 0.3677    | 0.1250         |

### Calculation 3.3 Medians by k

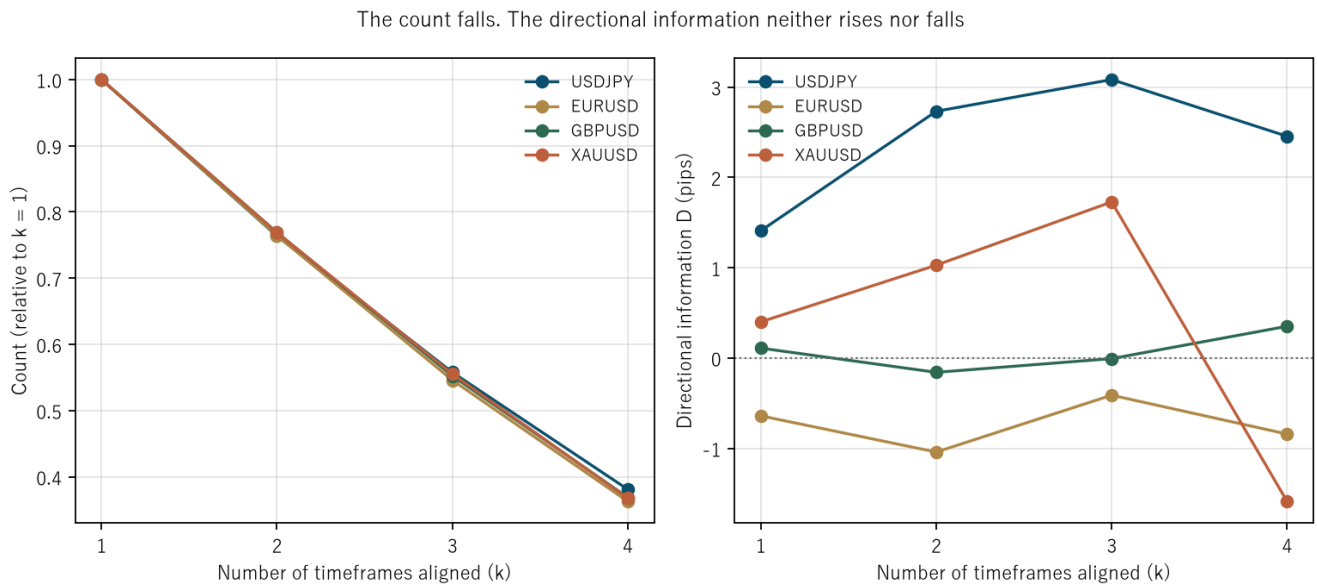
| k | Median D (pips) | Median absolute daily t | Cells with absolute value 2 or more |
|---|-----------------|-------------------------|-------------------------------------|
| 1 | +0.2548         | 0.5670                  | 1 / 4                               |
| 2 | +0.4347         | 0.5865                  | 1 / 4                               |
| 3 | +0.8606         | 0.2610                  | 0 / 4                               |
| 4 | − 0.2449        | 2.4643                  | 4 / 4                               |

**Observation 3.4:** the median count ratio is **0.3683**. Were the four independent it would be **0.1250**, so about three times as much survives. The four timeframes are not independent; they are **one price series seen at four resolutions**.

**Observation 3.5:** the median directional information runs **+0.2548, +0.4347, +0.8606, −0.2449** pips. It rises through **k = 3** and changes sign at **k = 4**. It is not monotone.

**Observation 3.6:** ⚠ at **k = 4** the median absolute daily t reaches **2.4643** and the significant cells become **4 of 4**. Chance gives about **0.2**, so read alone this says "aligning all four works".

**Observation 3.7:** ⚠️ but look at the sign: **Dd is negative in all four series** (−5.4733, −3.4725, −4.4598, −18.4721). That reads as "entering in the aligned direction loses". **It runs against what the practice claims**, which is reason enough to stop here.



**Figure 1:** on the left the count (relative to  $k = 1$ ), on the right the directional information. **The left falls the same way in all four series; the right is flat and scattered.**

## 4. Family B — multiplying the perfect-order conditions 1, 2, 3

### Calculation 4.1 Count and directional information by number of conditions (evaluation period)

| Instrument | Conditions | Count  | D (pips) | Dd (daily mean) | Daily t | Days | Per day |
|------------|------------|--------|----------|-----------------|---------|------|---------|
| USDJPY     | 1          | 17,841 | 1.6576   | 2.2002          | 1.14    | 935  | 24.0    |
| USDJPY     | 2          | 10,858 | −0.3119  | −8.4592         | −3.08   | 868  | 12.0    |
| USDJPY     | 3          | 6,368  | 0.8151   | −14.7604        | −4.94   | 815  | 7.0     |
| EURUSD     | 1          | 17,867 | 0.5151   | 1.3911          | 1.30    | 936  | 24.0    |
| EURUSD     | 2          | 10,592 | −0.3452  | −3.5403         | −2.41   | 867  | 12.0    |
| EURUSD     | 3          | 6,084  | −1.1296  | −7.5709         | −4.72   | 803  | 7.0     |
| GBPUSD     | 1          | 17,850 | −0.0960  | 0.5722          | 0.40    | 935  | 24.0    |
| GBPUSD     | 2          | 10,582 | −0.4649  | −6.7779         | −3.44   | 877  | 12.0    |
| GBPUSD     | 3          | 6,040  | −1.2266  | −11.9795        | −5.53   | 815  | 7.0     |
| XAUUSD     | 1          | 17,471 | 2.2325   | 0.2547          | 0.06    | 918  | 23.0    |
| XAUUSD     | 2          | 10,389 | −1.0276  | −24.7170        | −4.33   | 852  | 12.0    |
| XAUUSD     | 3          | 5,978  | −0.1845  | −38.7500        | −6.33   | 772  | 7.0     |



## Calculation 4.2 The effect of multiplying conditions

| Instrument | Condition 3 ÷ condition 1 (count) | D condition 1 | D condition 3 | Change in D |
|------------|-----------------------------------|---------------|---------------|-------------|
| USDJPY     | 0.3569                            | 1.6576        | 0.8151        | − 0.8425    |
| EURUSD     | 0.3405                            | 0.5151        | − 1.1296      | − 1.6447    |
| GBPUSD     | 0.3384                            | − 0.0960      | − 1.2266      | − 1.1306    |
| XAUUSD     | 0.3422                            | 2.2325        | − 0.1845      | − 2.4170    |

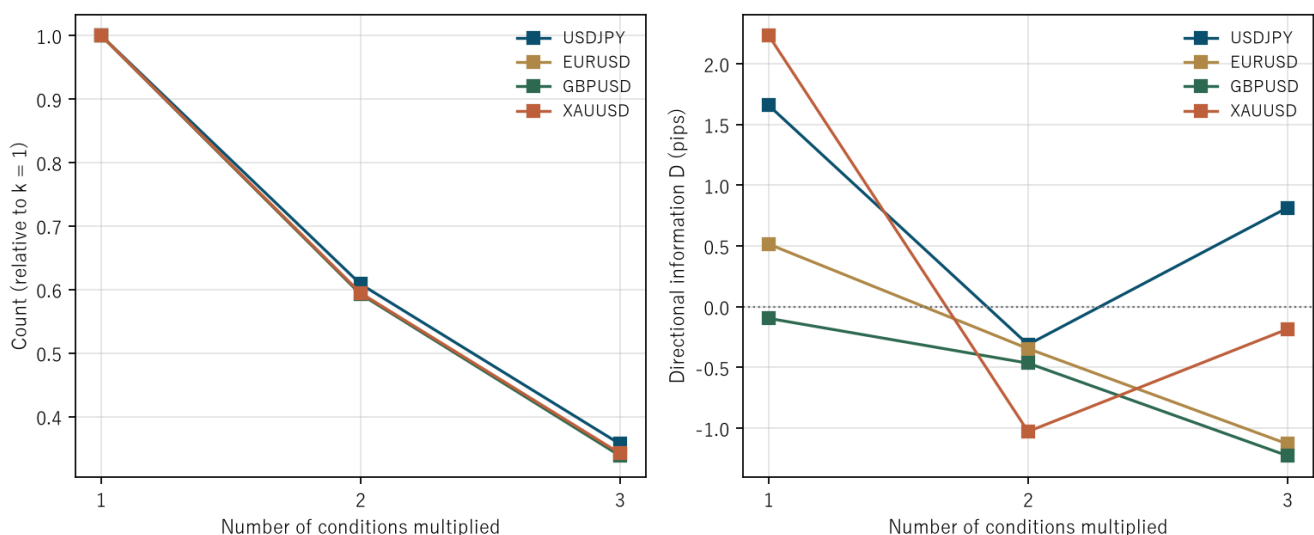
**Observation 4.3:** the median count ratio is **0.3413**. Multiplying three conditions leaves a third of the count.

**Observation 4.4:** the median change in directional information is **−1.3877 pips**, ranging from **−2.4170** to **−0.8425**. It is negative in all four series — adding conditions made it worse.

**Observation 4.5:** the median spread is **0.7500 pips**. The size of the change is of the same order as the spread, but **the sign is wrong, so there is no case for adding the conditions at all**.

**Observation 4.6:** ⚠ here too Dd deteriorates monotonically as conditions are added, reaching a daily t of **−6.33 (XAUUSD)**. **This is the same shape as Section 3**. The next section identifies it.

The same shape appears for the perfect order



**Figure 2:** on the left the count (relative to condition 1), on the right the directional information. **The same shape as Family A appears.**

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## **5. Removing the overlap — this is the separator**

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**Design:** do not open the next observation until the previous one has finished. With  $h = 24$  that leaves one observation every 24 bars.

### Calculation 5.1 Before and after the overlap (evaluation period)

| Instrument | Condition                      | Count | D (pips) | Dd (daily mean) | Daily t | Per day |
|------------|--------------------------------|-------|----------|-----------------|---------|---------|
| USDJPY     | Family A k=4, with overlap     | 6,798 | 2.4546   | − 5.4733        | − 2.15  | 8.0     |
| USDJPY     | Family A k=4, without          | 663   | 2.9468   | 2.9468          | 0.75    | 1.0     |
| USDJPY     | Family B cond. 3, with overlap | 6,368 | 0.8151   | − 14.7604       | − 4.94  | 7.0     |
| USDJPY     | Family B cond. 3, without      | 592   | 0.6837   | 0.6837          | 0.16    | 1.0     |
| EURUSD     | Family A k=4, with overlap     | 6,485 | − 0.8412 | − 3.4725        | − 2.56  | 8.0     |
| EURUSD     | Family A k=4, without          | 657   | − 0.9322 | − 0.9322        | − 0.43  | 1.0     |
| EURUSD     | Family B cond. 3, with overlap | 6,084 | − 1.1296 | − 7.5709        | − 4.72  | 7.0     |
| EURUSD     | Family B cond. 3, without      | 587   | − 0.8419 | − 0.8419        | − 0.37  | 1.0     |
| GBPUSD     | Family A k=4, with overlap     | 6,584 | 0.3513   | − 4.4598        | − 2.37  | 8.0     |
| GBPUSD     | Family A k=4, without          | 665   | − 5.4644 | − 5.4644        | − 1.94  | 1.0     |
| GBPUSD     | Family B cond. 3, with overlap | 6,040 | − 1.2266 | − 11.9795       | − 5.53  | 7.0     |

|        |                                   |       |          |           |        |     |
|--------|-----------------------------------|-------|----------|-----------|--------|-----|
| GBPUSD | Family B cond. 3,<br>without      | 601   | − 2.0435 | − 2.0435  | − 0.69 | 1.0 |
| XAUUSD | Family A k=4, with<br>overlap     | 6,424 | − 1.5865 | − 18.4721 | − 3.57 | 8.0 |
| XAUUSD | Family A k=4,<br>without          | 651   | 0.1210   | 0.1210    | 0.02   | 1.0 |
| XAUUSD | Family B cond. 3,<br>with overlap | 5,978 | − 0.1845 | − 38.7500 | − 6.33 | 7.0 |
| XAUUSD | Family B cond. 3,<br>without      | 584   | − 6.8297 | − 6.8297  | − 0.82 | 1.0 |

### Calculation 5.2 Before and after, summarised (medians of four series)

| Condition           | Count ratio | D with overlap | D without | Median absolute daily t, with | With |
|---------------------|-------------|----------------|-----------|-------------------------------|------|
| Family A<br>k=4     | 0.1012      | − 0.2449       | − 0.4056  | 2.4643                        | 0.5  |
| Family B<br>cond. 3 | 0.0971      | − 0.6570       | − 1.4427  | 5.2377                        | 0.5  |



**Observation 5.3:** ⚠ the median absolute daily t falls from 2.4643 to 0.5923 for Family A and from 5.2377 to 0.5286 for Family B. After removing the overlap, the cells with absolute value 2 or more number 0 of 4 for Family A and 0 of 4 for Family B. Chance gives about 0.2, so the measurement is below chance.

**Observation 5.4:** the count ratios are 0.1012 and 0.0971. Nine observations in ten were counted while the previous one had not yet finished.

**Observation 5.5:** ⚠️ for Family A the sign reverses in 2 of the 4 series. XAUUSD moves from  $-1.5865$  to  $+0.1210$  and GBPUSD from  $+0.3513$  to  $-5.4644$ . Removing the overlap is not an operation that improves precision; it is one that changes the quantity.

**Observation 5.6:** ⚠️ what read in Sections 3 and 4 as "aligning makes it significantly negative" was made by the overlap. Counting the same event eight times pulls the daily mean toward that event. Daily clustering folds only the overlap within a day; the overlap across days remains.

**Observation 5.7:** ★ the answer of this paper is therefore double. Adding conditions does not raise the directional information (Sections 3 and 4). And what looked like "adding works, or fails, significantly" also disappears once the overlap is removed (this section). What remains is only the fact that the count fell.

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## 6. Is the k that was best in the selection period best in the evaluation period?

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### Calculation 6.1 Ordering across periods (Family A)

| Instrument | Best k in selection | That k's evaluation D | Best k in evaluation | Match |
|------------|---------------------|-----------------------|----------------------|-------|
| USDJPY     | 4                   | 2.4546                | 3                    | no    |
| EURUSD     | 4                   | $-0.8412$             | 3                    | no    |
| GBPUSD     | 4                   | 0.3513                | 4                    | yes   |
| XAUUSD     | 4                   | $-1.5865$             | 3                    | no    |

**Observation 6.2:** in the selection period  $k = 4$  was best in all four series. Read alone, that says "the more aligned the better".

**Observation 6.3:** in the evaluation period the best was  $k = 3$  in 3 of the 4 series. The match is 1 of 4 against 1.0 by chance, so the selection-period ordering does not carry over.

**Observation 6.4:** ⚠️ this does not mean "k = 3 is correct". It means that **the act of picking the best from four values of k gives a different answer in each period.**

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## 7. The baseline — does a random walk "align" too?

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### Calculation 7.1 One path, aggregated into four timeframes (10 realisations, evaluation period)

| Instrument | Measured $k=4 \div k=1$ | Random walk $k=4 \div k=1$ | Difference |
|------------|-------------------------|----------------------------|------------|
| USDJPY     | 0.3810                  | 0.3918                     | − 0.0107   |
| EURUSD     | 0.3630                  | 0.3895                     | − 0.0266   |
| GBPUSD     | 0.3689                  | 0.3910                     | − 0.0221   |
| XAUUSD     | 0.3677                  | 0.3912                     | − 0.0235   |

**Observation 7.2:** the random walk's count ratio runs from 0.3895 to 0.3918 — higher than the measured 0.3630 to 0.3810. The median difference is −0.0228.

**Observation 7.3:** ⚠️ a synthetic random walk has no uptrend, no downtrend, no support and no resistance. **The four timeframes align at the same rate anyway.** Alignment is not a property of the market but a consequence of **looking at one price series at four resolutions.**

**Observation 7.4:** ⚠️ one error was made here and corrected. **The first version drew a separate random series for each timeframe.** Those are four independent paths, which is not the situation in question — one series seen at four resolutions. That version gave count ratios **almost exactly equal to the independent value of 0.1250.** ★ **When a baseline agrees too well with the theoretical value, suspect the baseline.** In the corrected version one path is built on five-minute bars and aggregated into fifteen-minute, one-hour and four-hour.

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## 8. Splitting by session

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**Design:** five **non-overlapping** bins in Coordinated Universal Time. The signal is Family A at  $k = 4$ .

### Calculation 8.1 Directional information in each of the five bins (evaluation period)

| Instrument | Tokyo 0–7            | London 7–12          | Overlap 12–16        | NY late 16–21         | Night 21–24        |
|------------|----------------------|----------------------|----------------------|-----------------------|--------------------|
| USDJPY     | 1.90 (t<br>– 0.36)   | 6.69 (t 0.37)        | – 5.49 (t<br>– 2.05) | 3.62 (t – 0.57)       | 7.00 (t 1.54)      |
| EURUSD     | – 0.67 (t<br>– 0.13) | – 0.20 (t<br>– 0.98) | – 1.51 (t<br>– 2.17) | – 1.63 (t<br>– 1.79)  | 0.17 (t<br>– 0.17) |
| GBPUSD     | 1.00 (t<br>– 0.08)   | – 2.20 (t<br>– 2.30) | – 0.09 (t<br>– 1.59) | 1.14 (t – 0.81)       | 2.90 (t 0.51)      |
| XAUUSD     | – 3.47 (t<br>– 1.02) | 7.95 (t 0.24)        | – 1.08 (t<br>– 1.03) | – 11.37 (t<br>– 1.33) | 6.94 (t 0.33)      |

**Observation 8.2:** the daily  $t$  reaches 2 in absolute value in **3 of 20** cells. Chance gives about **0.9**, so the measurement is above it.

**Observation 8.3:** ⚠️ but these three are measured on a signal that still carries the overlap. As Section 5 showed, the daily  $t$  with the overlap is inflated. **What looked like more than chance in the session split must not be read as a property of the market.**

**Observation 8.4:** ⚠️ the three that look significant are two in Overlap 12–16 and one in London 7–12, and **all three are negative**. ⚠️ This paper does not claim them. **Removing the overlap leaves only 584 to 665 observations, and splitting that into five bins is not enough precision to measure.**

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## 9. Limitations

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1. ★ **One combination of timeframes is fixed.** Five-minute, fifteen-minute, one-hour and four-hour, with SMA(20). Other combinations give other figures. ⚠ The conclusion of Section 5 (removing the overlap drops t) follows from h and the counts rather than from the combination.
  2. **"Aligned" is defined as agreement in sign.** Agreement in slope, or in ordering, is a different definition. Family B is one example, and it gave the same shape.
  3. **The order in which timeframes are added is fixed from the front:** five-minute, fifteen-minute, one-hour, four-hour. Another order changes the intermediate values of k. ⚠  $k = 1$  and  $k = 4$  do not depend on the order.
  4. **After removing the overlap the counts are 584 to 665.** At that count an effect of the same order as the spread is not visible. **"Not significant" means "not visible at this count", not "not there".**
  5. **Section 8 still carries the overlap.** Removing it leaves too few observations per bin.
  6. **The synthetic baseline uses independent normal increments.** Volatility clustering is not included.
  7. **Four instruments over six years.** Nothing is said about other markets or other periods.
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## Conclusion

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Aligning four timeframes leaves **0.3683** of the count. Lining up three moving averages leaves **0.3413**. **Both follow from having multiplied conditions.**

Had what remained concentrated by as much as the count fell, the directional information would have risen. **It did not.** The medians for Family A run **+0.2548, +0.4347, +0.8606, -0.2449 pips**, not monotone, and the median change for Family B is **-1.3877 pips**, negative in all four series.

And what looked like "aligning makes it significant" was made by the overlap. Opening the next observation only after the previous one has finished leaves **0.1012** of the count, drops the median daily t from **2.4643** to **0.5923**, and takes the significant cells from **4 of 4** to **0 of 4**. **For Family A the sign reverses in 2 of the 4 series.**

Building one synthetic path and aggregating it into the four timeframes gives an alignment share of **0.3895 to 0.3918 — higher than the measurement.**

**Alignment is not a property of the market. It is one price series, seen at four resolutions.**

## Data and reproduction

|                            |                                                                                                                                                     |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Data                       | Currency ticks from Dukascopy (agreement to the millisecond, bid and ask, verified from 2019 onward). Gold from Dukascopy                           |
| Period                     | 2019–2024 (six years). Selection 2019–2021, evaluation 2022–2024                                                                                    |
| Instruments                | USDJPY, EURUSD, GBPUSD, XAUUSD                                                                                                                      |
| Bars                       | Five-minute, fifteen-minute, one-hour, four-hour. Mid price, closing value of completed bars only. Bars with no ticks are not created               |
| Higher-timeframe reference | Only bars whose end is at or before the base timestamp (never a bar still in progress)                                                              |
| Verification               | <code>検算/F010.py</code> (with <code>--zu</code> it also writes the figures). Every number in the text is taken from <code>検算/F010_output.txt</code> |
| Figures                    | <code>図/F010_zu1</code> , <code>図/F010_zu2</code> (png, svg, English versions)                                                                      |
| Random seeds               | Fixed at 0–9. Re-running gives the same values                                                                                                      |
| Audit of the foundation    | <code>_ツール/audit_bars.py</code> (look-ahead in the bars, daylight saving, the day boundary). The record is <code>_土台の検査.txt</code>                  |

## References

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