



ADKDD '26 · AUGUST 2026 · JEJU, KOREA

Attributed, But Not Incremental

Cannibalization-Corrected Attribution for Large-Scale Advertising

Authors: Donghui Li* · Bowen Yuan* · Zili Yang · Qinxin Chen · Lijing Song

TikTok · User Growth, Data Science

Contact: donghui.li@bytedance.com, xiangyang.yuan@bytedance.com

Executive Summary



PROBLEM

Attribution $\neq$ incrementality

Paid-attributed DNU can overstate true incremental.

Attribution errors bias ROI and misallocate budget to low-quality traffic.



METHOD

ETDC + HCA framework

ETDC aligns with experiments and estimates daily cannibalization.

HCA allocates correction across finer-grained business hierarchies consistently.



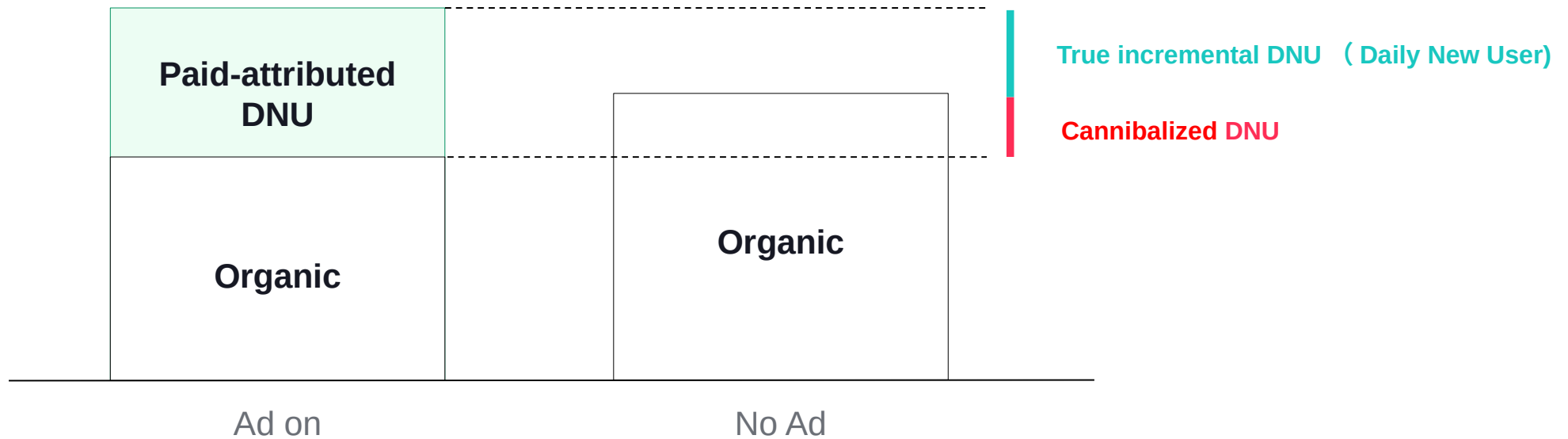
IMPACT

91.38% error reduction vs. raw attribution.

~15 pp cannibalization drop across markets.

PROBLEM

Attribution $\neq$ incrementality



The Practical Puzzle

PRODUCTION ATTRIBUTION

- ✓ Timely & granular
- ✗ Observational & biased

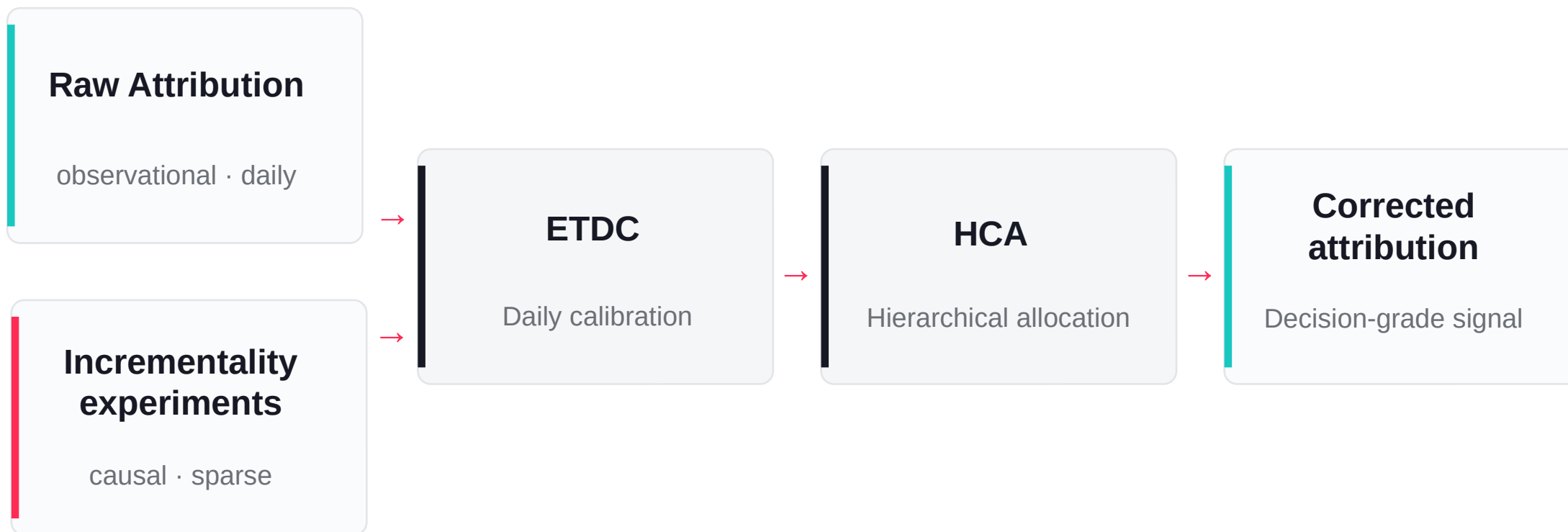
INCREMENTALITY EXPERIMENTS

- ✗ Sparse & expensive
- ✓ Causally credible

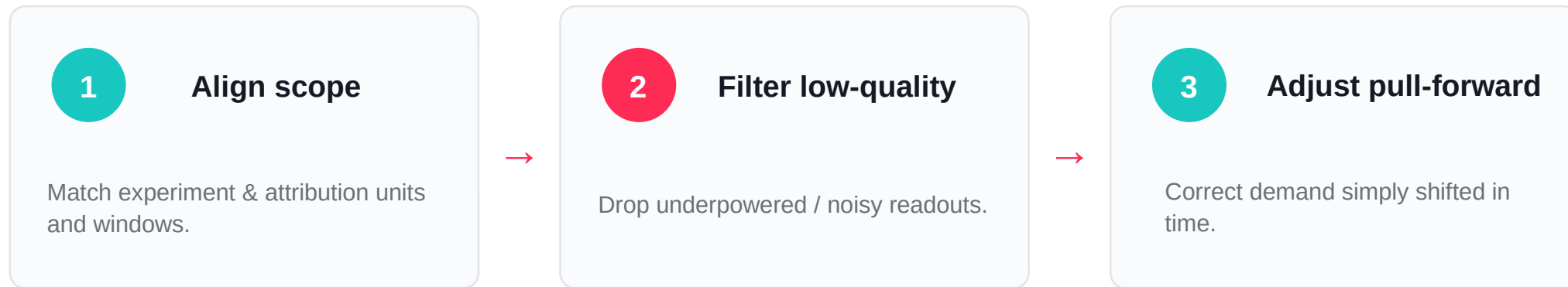
Use sparse experiments to calibrate the daily attribution signal.

SOLUTION

ETDC Experiment-to-Daily Calibration + HCA Hierarchical Cannibalization Allocation



Experiment Signal Construction



Result: qualified experiment signals become causal anchors for calibration.

ETDC: from sparse causal lift to daily correction

Learn a mapping: production features → anchored lift

- **Proxy** — engagement / spend proxies
- **Temporal patterns** — seasonality, day-of-week
- **Channel-state** — saturation, competition

WHY ROBUST

Generalized linear model

stability & interpretability come first.

Huber loss

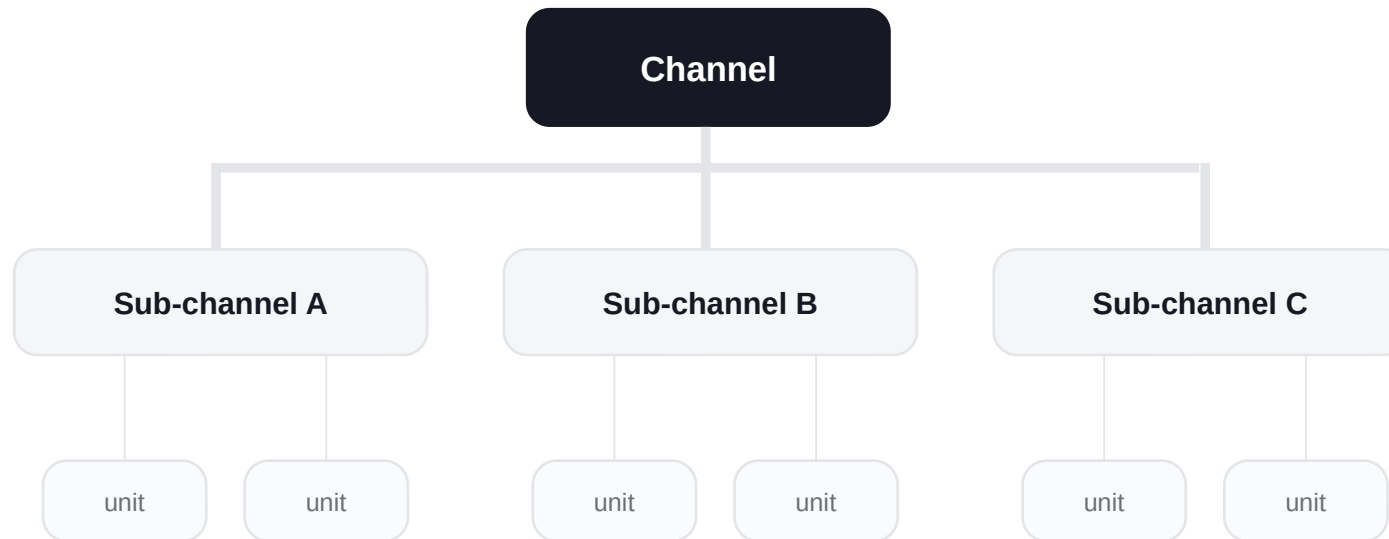
down-weights noisy experiment readouts.

Boundary control

keeps corrections in a plausible range.

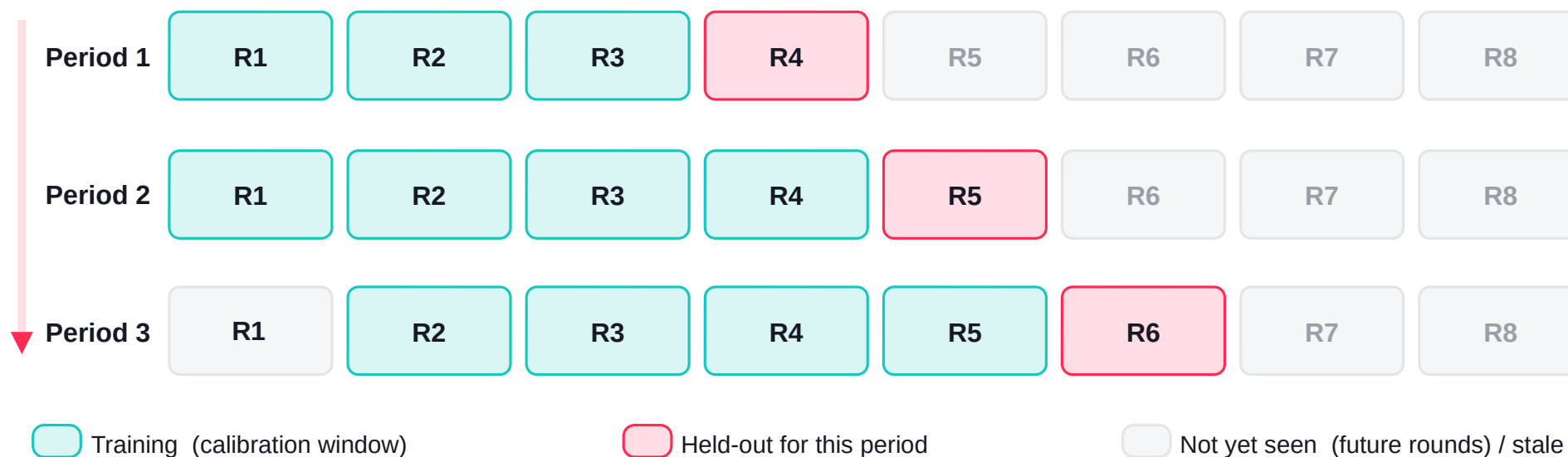
SOLUTION

HCA: make corrections actionable without breaking totals



Forward-in-time evaluation protocol

Moving window / rolling forward: each new experiment round is tested first, then absorbed into the calibration set.



VALIDATION

Overall Performance

Method	Error Index	Err. Red.	Med. RE	IQR
Raw Attr.	1.00	–	–	–
Device ML	0.31	69.11%	-4.80%	[-38.08%, 44.27%]
ETDC+HCA	0.09	91.38%	0.60%	[-8.11%, 7.24%]

Normalized error index (Raw = 1.00, lower is better)

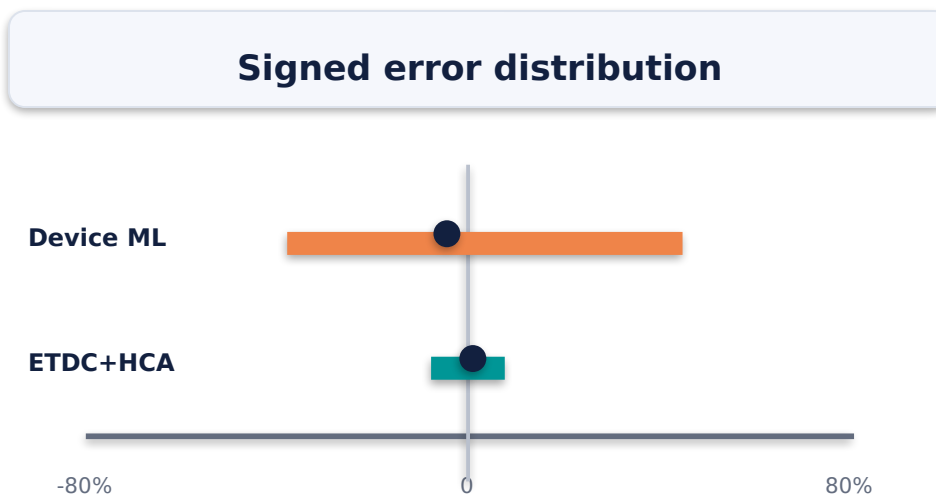
91.38%

error reduction
vs. raw attribution

VALIDATION

The gain holds across slices

Market	Channel	Round	ETDC+HCA	Device ML	Raw Attr.
A	Channel 1	Round 1	-2%	58%	214%
A	Channel 1	Round 2	-7%	46%	179%
A	Channel 2	Round 1	3%	-63%	200%
A	Channel 2	Round 2	-4%	-64%	225%
B	Channel 1	Round 1	10%	11%	214%
B	Channel 1	Round 2	-4%	33%	224%
B	Channel 2	Round 1	7%	-63%	334%
B	Channel 2	Round 2	3%	-75%	259%



Deployed as a correction layer — measurable impact



Add-on layer

on top of the existing attribution pipeline — no replacement.

Multi-market

rollout across global TikTok markets.

Budget & traffic

strategies re-tuned on corrected signals.

Limitations & Future Work

RECAP

ETDC + HCA calibrate production attribution with sparse experiments — keeping it operational.

LIMIT

- Experiment, proxy must be monitored
- Fine-grained outputs are allocations, not causal
- Negative cannibalization needs further modeling

NEXT

- Cross-channel substitution, complementarity and spillovers
- Automated recalibration
- Richer diagnosis under market shocks and product launches