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CONNECTIONS / COMMERCE / CREATIVE

Amazon's COSMO Decoded: Optimizing for Retail Knowledge Graphs

How to Adapt your Product Pages to Amazon's New AI Algorithm

Amazon is officially diving into the world of AI with the recent publication from Amazon researchers outlining two important updates: RUFUS, their new shopping assistant and COSMO, a newly integrated AI tool that has the potential to impact everything we know about organic search on Amazon. RUFUS was released mid-June, 2024, and is live on Amazon's mobile app to all U.S. shoppers today. COSMO has been in testing over the last several months, targeting approximately 10% of US traffic. While there has been no official announcement of a launch date as of yet, this is likely to be a situation in which Amazon will incrementally ramp up COSMO production and integration into the algorithm with no official announcement.

WHAT COSMO DOES

COSMO seeks to create a smarter, more customer-friendly and personalized shopping experience through its complex process that integrates an AI LLM (Large Language Models), like the technology behind ChatGPT. This AI integrated tool is designed to identify and understand the intentions behind a customer's purchase; something that has been a historically difficult nut to crack in the ecommerce space.

This is much easier said than done; there are many subtleties and nuances to the relationship between human behavior and human intention that make it difficult for current ecommerce systems to decode. COSMO's solution is simple: align the power of AI language models with the unmatched ingenuity of real human feedback to create "common sense knowledge."

For example, if you searched Amazon for "furniture for small apartments," what you really might be looking for is multi-functional furniture, like a sofa bed or a storage ottoman that would be practical to maximize space. However, that purchase intention is not easily made evident to current ecommerce search algorithms. COSMO's ability to understand and apply common sense knowledge suggests a potential to revolutionize Amazon's search, navigation and product recommendation services. **This isn't just Amazon suggesting products — it's about truly understanding the why, or search intent, behind each and every search.**

Here's how it works:

First, Amazon records millions of customer's on-site behaviors, creating massive stores of data for analysis. COSMO aims to uncover the intentions behind these behaviors and it does so by examining two behaviors, co-buy and search-buy:

→ **Search-buy:** when a customer searches for an item and buys it

→ **Co-buy:** when a customer often buys certain items together

Once co-buy and search-buy behaviors have been identified, they are given to an LLM along with instructions to explain the user behaviors using a variety of carefully selected, fine tuned, "relation-aware" prompts. LLMs are designed to understand and generate human language. The LLM outputs millions of behavior samples, known as **knowledge triples,** which are statements that define what the relationship between a product and behavior is and perhaps more importantly, how the two pieces of information are related. Such statements allow human annotators to summarize the relationship between behavior and intention at massive scale and ultimately provide customers with an enhanced buying experience.

Knowledge triples consist of three elements: behavior, relation, and tail. To better understand knowledge triples, consider the following co-purchase example: "Customers buy headlamps and cycling jackets together (the behavior) because they are both capable of increasing their visibility to motorists (the relation)." "Increasing their visibility to motorists" is the tail under the relation capableOf. COSMO defines 15 different relationships such as, capableOf, usedOn and usedTo when generating knowledge triples. They serve as predicates that help explain the relation between the behavior and the relation. For search-buy examples, the LLM AI is given a product and a query and is instructed to explain the search-buy relation between the two depending on the relation provided. Here's an example of this in action:

**Instruction:** Explain the search-buy pair with the capableOf relation.

Query: Dog Walking Jacket

Product: 2 Pack Reflective Runners Vest

Output: Provide visibility to motorists

Together, COSMO's many knowledge triples make up networks, known as **knowledge graphs,** that serve as the primary basis for encoding information with semantic web technologies.This sophisticated web connects pieces of information together to highlight their relationships. Each point (node) represents a piece of information, such as a windbreaker jacket, while the lines (edges) show their connections, such as linking "headlamps" and "cycling jackets" to "waterproof" and "high visibility to motorists."

COSMO has 6.3M nodes and 29M edges, more than any other existing ecommerce **knowledge graphs.** Other ecommerce Knowledge Graphs, such as FolkScope, extract co-buy intention, "based on thousands of co-purchase item pairs within two categories." COSMO on the other hand, operates in 18 categories and while it too examines co-purchase intentions, it also examines the purchasing behavior when customers search for products, also known as search-buy. In other words, COSMO is examining what products are being purchased from a result of different search queries to create a framework to better align with customer's diverse and extensive intentions.
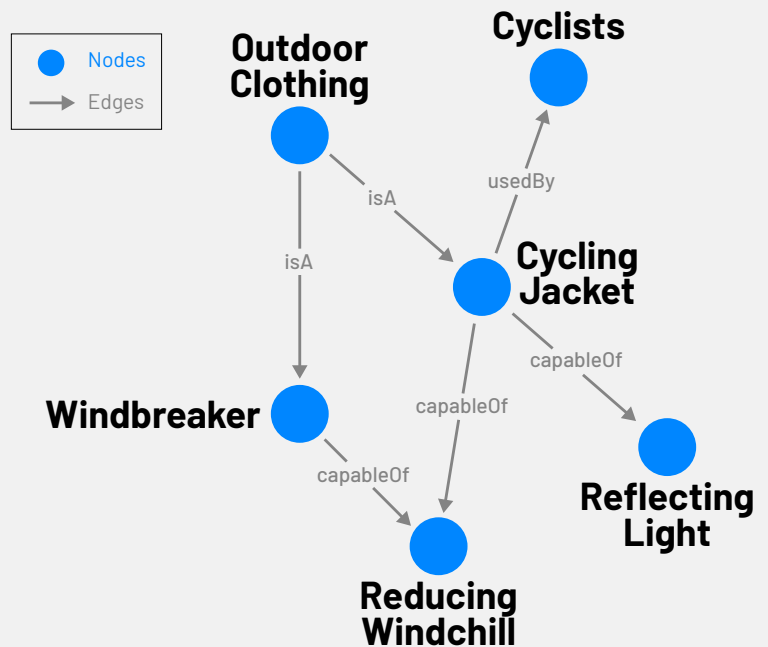
COSMO can sample millions of customer behavior pairs, however, it does not always yield accurate results. To combat this, COSMO also leverages Human-in-the-loop (HITL) Annotation. This process combines human expertise with machine learning to enhance AI accuracy. The process starts with simple, rule-based filtering to eliminate any incomplete or irrelevant knowledge generations. Think misspelled words, grammatical errors, and incomplete sentences. Then, the data is filtered through a second, more precise round of refinement to remove any semantically similar instances from the data pool. Finally, human annotators review the remaining amounts of behavior-intent knowledge, examine efficacy, provide feedback, and supply nuanced understanding that the AI might miss.

This feedback is all fed back into the AI model, helping it learn and improve over time. With this, COSMO has been able to deploy millions of valuable knowledge for Amazon commerce applications. This advanced method enhances context and understanding, making search results and recommendations more accurate. Additionally, it's an intelligent way to organize data at a massive scale.

There are, however, stipulations to when and how COSMO is employed on site - not each and every search will leverage COSMO. Amazon states , "As our goal is to make up the semantic gap between the search query and the product, generating knowledge for the broad or ambiguous query are of more values to narrow down clear needs." **In other words, COSMO is not being leveraged in specific search queries but rather, it aims to add context to the more open-ended and unclear search queries.**

SESSION-BASED RECOMMENDATION

When you shop on Amazon, it's not just about whether or not you purchase a product: every interaction you make or don't make on the site is important. These interactions shape COSMO's recommendation system and help customers find products by analyzing their interactions within sessions, which are short periods where multiple products are viewed or purchased. So when you bounce from one product to another, reading reviews, refining your search and ultimately making a purchase, COSMO is learning more about your purchase intent to become more accurate.

Traditional session-based models use advanced techniques to predict the next product a user might click on, focusing only on item interactions. COSMO's enhanced approach also incorporates users' search keywords, providing additional context about their intentions.
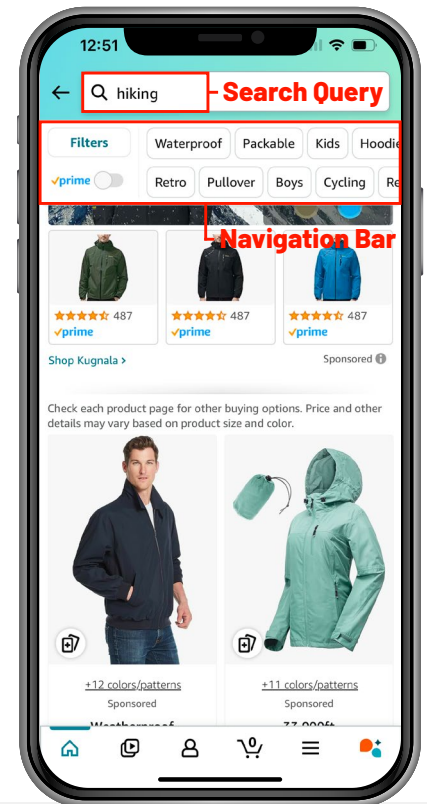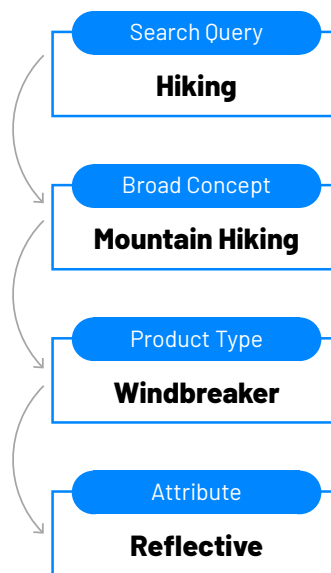
In an Amazon released study on COSMO, they conducted experiments with one week of shopping data for clothing and electronics. The tracked performance of COSMO's combined session graphs with search query information showed that they outperformed other existing models. This suggests that considering search behavior along with item interactions significantly improves recommendation accuracy, especially in complex scenarios like electronics or hardware shopping. The results suggest that keywords aren't dead and will always be an important part of the Amazon search algorithm – but – they'll be used differently in the future.

COSMO provides a smarter shopping experience, aimed to offer search solutions, not just search results.

SEARCH NAVIGATION

Speaking of the SERP... COSMO has the potential to revolutionize e-commerce search navigation. Currently seen only in certain categories, are changes to Amazon's typical category tree and website taxonomy. These enhancements allow customers to further filter their search results to options that COSMO has tailored for each customer, based off of their behavior and search query. Based on preliminary results, Amazon has stated that so far, this feature has shown to significantly boost revenue and improve user satisfaction.

While it's unclear exactly how much COSMO is currently being used as part of the algorithm, Amazon noted they conducted A/B tests over several months, targeting approximately 10% of US traffic. The results showed a 0.7% increase in product sales and an 8% rise in navigation engagement.

Search Query
Hiking

Broad Concept
Mountain Hiking

Product Type
Windbreaker

Attribute
Reflective

COSMO organizes search terms into detailed hierarchies, helping users refine broad queries like "urban hiking" into specific needs such as "urban hiking" and "windbreaker." For instance, a "hiking" search can be refined to "windbreaker". COSMO then seeks to refine the session further by showing different types of options, such as, reflective, waterproof, or insulated. This process is called multi-turn navigation and it allows for a seemingly more refined and natural discovery process. Each search experience can be customized to each individual customer.

SO, ARE KEYWORDS DEAD?

No, keywords are not dead. But traditional lexical, exact match SEO strategies are. What we know to be 'keywords' or search phrases are of course still necessary to uncover and incorporate into Amazon PDPs. This is how shoppers will continue to search. Search terms and phrases give the algorithm the context to better understand the product and allow it to form the best possible perception of the product.

However, the Amazon keyword strategy for titles in particular should remain mainly unchanged. According to Amazon's COSMO study, "In real ecommerce systems, each product is accompanied by side information, e.g., product title, descriptions and attributes. To be simple, we concatenate them into one single text span... As aforementioned that there remains semantic gaps between user intentions in the query and product information we leverage COSMO-LM to generate commonsense knowledge behind the query-product pairs and explicitly enhance their connections...."

In other words, after a customer submits a query to the search bar, what appears in the SERP are concatenations of product titles, bullets, descriptions, etc., which must meet the thresholds of relevancy and performance based on many factors such as sales velocity, price, relevancy.

"s mentioned earlier, Amazon is not asking COSMO to explain the relationship between customer behavior and highly specific keywords. They seek to bridge the gap between customer behavior and search queries that are vague and require common sense knowledge. As such, it is Code3's perspective that highly relevant and searched keywords should still be placed as early in the title as possible. This is especially true for keywords that align with the primary intent of the product, as doing so will resonate better with shoppers and enhance the click-through rate (CTR) in the SERP. Additionally, organic and sponsored striking distance keyword tactics (i.e. finding relevant keywords that a product is on the cusp of ranking on page one for) are still best in class strategies and will likely remain unchanged as COSMO continues to roll out.

While some Amazon SEO tactics remain static, the now critical role of query intent requires a closer look at the buying intent of every product, from the top of the funnel to the bottom. Generally there are 4 types; **informational, investigational, navigational,** and **transactional.** Certain keywords fall into different types of buying intent.

For example, an investigatory query such as "best jacket for skiing" is very different from a transactional query such as "gifts for outdoorsy men," where the customer is already primed to make a purchase. With this in mind, consider an adjustment in keyword strategy: instead of loading a PDP with keywords that have high search volume but do not vary in buying intent, consider implementing a more balanced approach of keywords that align to each portion of the funnel.
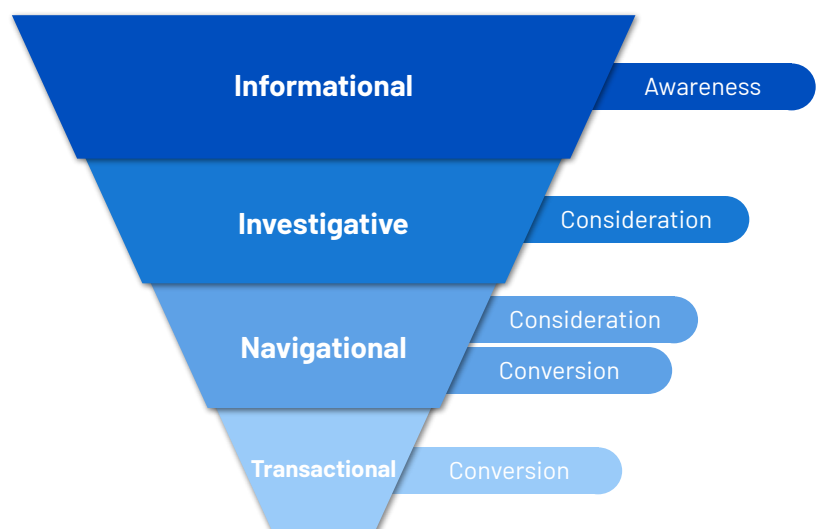
In addition, using generic keyword fields will become important for including any keywords that don't quite make the cut for front end copy. By following these steps, sellers can align their product listings with customer intentions, making it easier for COSMO to identify and match their products with relevant customer searches and preferences. This approach not only improves product visibility but also enhances the overall customer shopping experience.

HOW CAN SELLERS TAP INTO BUYING INTENT?

Buyer intent is the new exact match keyword strategy. So what now? Here are some ways that brands can identify and leverage buying intent:

Behavior Analysis

While COSMO's direct interface may not be available to sellers, the outcomes of its analysis like better recommendations and search results provide indirect insights into customer preferences. We can observe which products are recommended together or which keywords are driving traffic and act accordingly. For example, if winter gloves are being recommended alongside our winter jacket, we can glean the intent of overall winter gear.

Trending Products & Keywords

We can leverage the improved performance of certain products or keywords as indicators of customer preferences and market trends, allowing them to adjust their inventory and marketing strategies accordingly.

Performance Metrics

We can use performance metrics (such as increases in product views, organic keyword ranking, clicks, and purchases) to infer which aspects of their listings are working well. By analyzing this data, sellers can optimize their product listings to better align with what COSMO is identifying as relevant to customers.

Search Query Performance (Seller Central)

The Search Query Performance Dashboard in Seller Central highlights the top customer queries that drive traffic to your brand's products. It provides insights into key metrics like impressions, clicks, cart adds, and purchases for each query, along with your brand's share of these metrics. You can view this data at a brand and ASIN level.

Audience Insights

Utilize powerful DSP reports that allow brands to uncover audience information from the various demographic, in-market, and lifestyle data - utilizing overlap reports to create more data-backed content that reaches new and relevant audiences.

Continuous Improvement

We can continually refine our listings based on observed performance. For example, if certain keywords or product features lead to higher visibility and sales, these insights can guide further optimization.

UTILIZING CUSTOMER FEEDBACK AND FOCUSING ON USER EXPERIENCE

There's no better way to decipher user intent than by paying attention to what shoppers tell you. There are a wide variety of consumer signals that brands can leverage, including:

Behavior Analysis

Sellers can analyze customer reviews and feedback to identify common terms and phrases that customers use to describe their products. These insights can be incorporated into the product listing to align better with how customers think and search. Amazon tools that brands can leverage to analyze reviews and returns include:

- **Product Opportunity Explorer (Seller Central):** The product return and customer review insights within the Product Opportunity Explorer are great resources to uncover elements within the category that customers find most important to purchasing decisions.

- **Feedback Manager (Seller Central):** This page allows sellers to monitor reviews and customer satisfaction with your business. Access short- and long-term metrics, along with detailed feedback entries, to gain valuable insights into how well your service is meeting customer expectations.

- **Concessions Dashboard (Vendor Central):** If you're a vendor, the Concessions Dashboard will be your go-to place to view detailed customer reviews and returns that can provide crucial insight into what your customers' shopping intent might look like.

- **Voice of the Customer (Seller Central):** If you're in Seller Central, navigate to the Voice of the Customer page to view customer feedback. Additionally, you can view customer experience (NCX) ratings.

Audience Insights

Regularly updating listings based on feedback and data from COSMO can create a feedback loop where the system continually refines and improves keyword matching.

Continuous Improvement

COSMO encourages a shift from purely technical SEO tactics to a more user-centric approach. This means understanding what customers are looking for and how they describe their needs, leading to more intuitive and natural keyword intent.
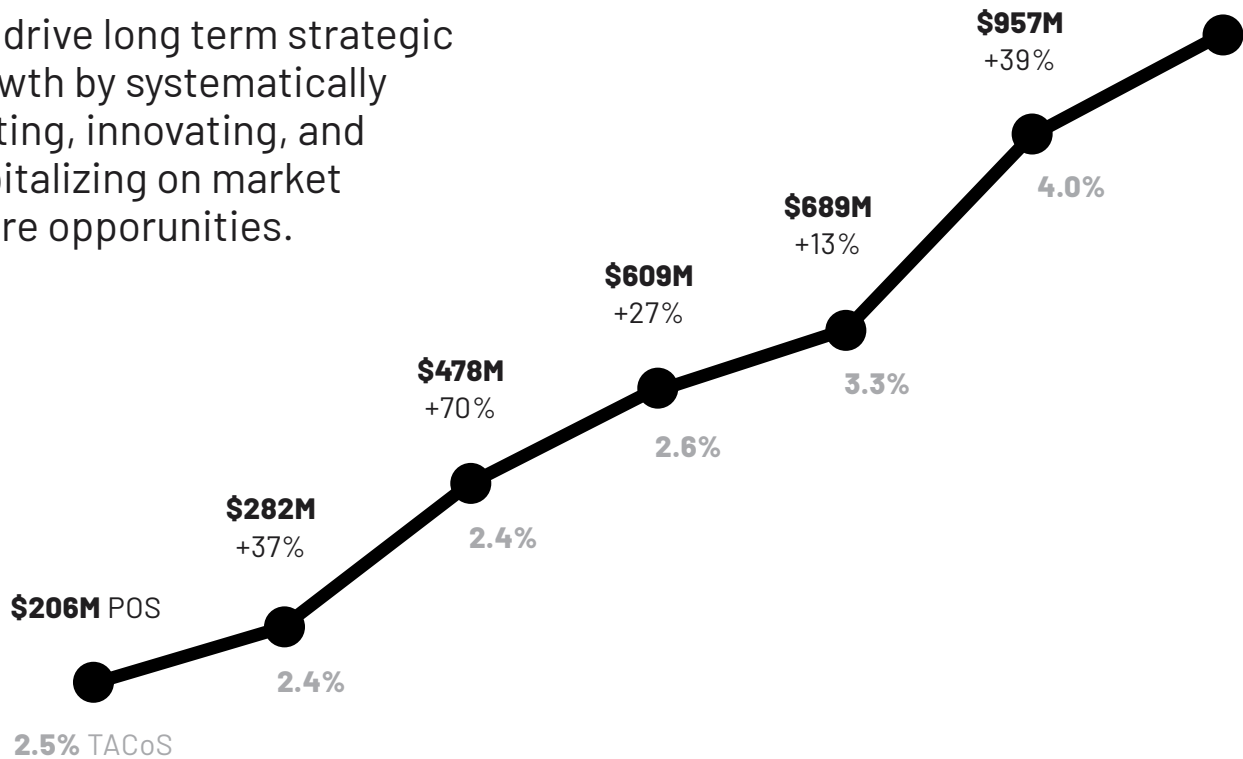
As customers, COSMO revolutionizes the way we shop. Imagine searching for a winter coat and getting exactly what you need—warm, waterproof, and stylish—without sifting through endless options. That's COSMO at work, making your shopping experience smoother and more satisfying.

As a seller, forget keyword stuffing and guessing games. COSMO isn't just matching search queries with keywords in titles; it goes several layers deeper, tapping into buying intent and providing accurate solutions to customer's problems. COSMO's ability to generate common sense knowledge and understand customer behavior helps sellers identify more accurate and relevant keywords. This understanding goes beyond simple keyword matching to include the context and intent behind searches, leading to better product discovery, better rankings in the search results, and more conversions.

Ready or not, COSMO is coming, and brands that begin to adjust their Amazon SEO and keyword strategy now will be better off in the long run.

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$689M
+13%

4.0%

$609M
+27%

3.3%

$478M
+70%

2.6%

$282M
+37%

2.4%

$206M POS

2.4%

2.5% TACoS

2018	2019	2020	2021	2022	2023	2024
Initiation + Expansion		Growth				The Moon

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LET'S TALK