ABSTRAX® TECH

the EFFECTS_LAB by budboard™

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Quantified Mood Impressions of Abstrax AI Terp Effects Blends

A Cannabis Industry Milestone

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Introduction

Terpenes and Mood

Terpenes are a large class of natural molecules found in plants. They are the key components of the aroma of leaves, fruits, and flowers. The terpene D-limonene, for example, has a sharp citrus scent and is a significant contributor to the taste and smell of lemon juice and lemon peel.

Terpenes are also abundant in the flowering heads of cannabis plants. There they are responsible for much of the characteristic smell of cannabis, as well as the distinctive aroma of each individual strain. They may also contribute to the psychoactive effect of a given strain—a phenomenon known as the "entourage effect."

Abstrax Tech and The Effects Labs by Budboard Product Innovation

Abstrax *Tech* is known for its terpene blends made from food-grade, all-natural FEMA-GRAS ingredients. The blends are based on terpene profiles found in popular strains of cannabis—however they contain none of the cannabinoids such as THC and CBD which occur in the plant biomass.

Abstrax *Tech* recently developed five AI Terp Effects blends *in partnership with The Effects Labs by Budboard* to address specific mood states. The blends are called Relaxed, Inspired, Energized, Focused, and Peaceful.

These blends can be used to enhance the sensory experience of a variety of consumer products. For example, they can add fragrance and flavor to cannabinoid-free products such as foods and functional beverages. Or they can be added to products that already contain cannabinoids in order to enhance and extend psychoactive effects on mood.

Using Sensory Testing to Profile New Terpene Blends

Abstrax Tech and The Effects Lab by Budboard have teamed up with **Dr. Avery Gilbert** and sensory consulting firm **Synesthetics, Inc.** to produce the first sensory evaluation of cannabis-related terpene blends.

In Dr. Gilbert's study consumer panelists used a sniff-test protocol to deliver **quantitative mood impression data** for each terpene blend. The results confirm that the **scents are well aligned with the moods** targeted by the innovation and product development team at Abstrax Tech and The Effects Lab by Budboard.

How the Study was Conducted
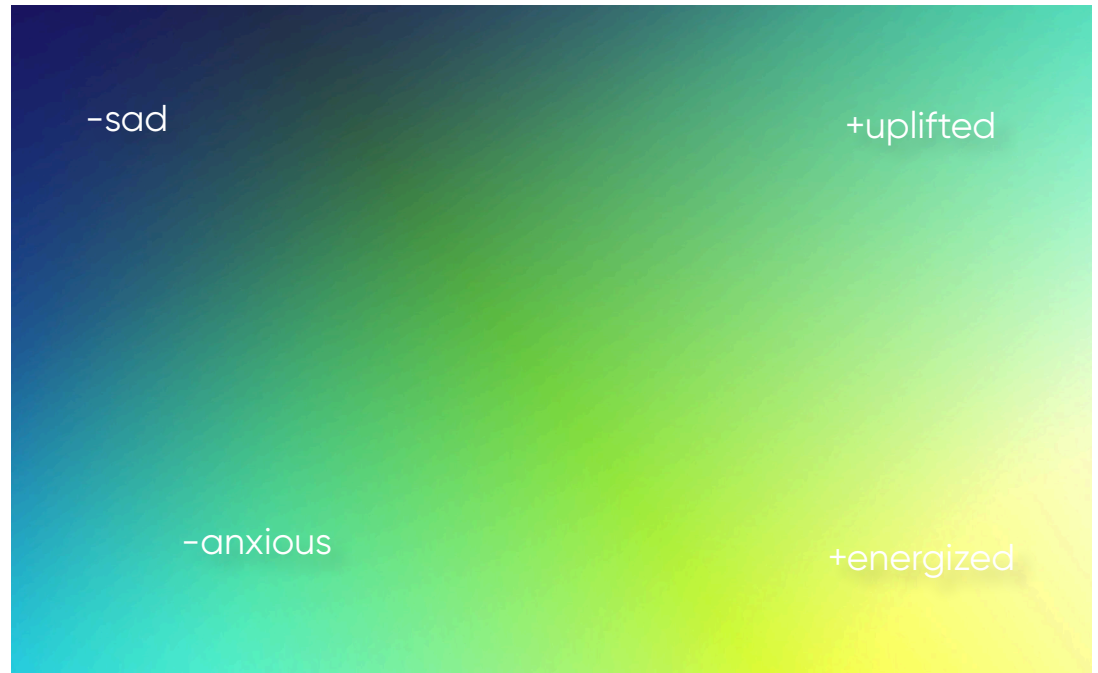
Dr. Gilbert used a quantitative sensory evaluation technique to measure the mood impressions of the Abstrax terpene blends. The consumer panelists were 30 men and women with an average age of 30 years. They sniffed each sample from a perfumer's blotter and rated its mood impression using Mood Descriptor Profiling, a technique Dr. Gilbert has used to measure consumer response in a wide range of products.

The terpene blends were rated using both positive and negative mood descriptors. Negative descriptors such as anxious and sad were included to assess whether consumers had unfavorable impressions of the blend's scent. Positive descriptors such as energized and uplifted were used to see how closely consumer impressions matched the targeted moods.

Panelists rated each sample blind—that is, without being provided a product name or any other description of the intended mood profile.

The study protocol was reviewed and approved by WCG-IRB in Puyallup, Washington.

Study Objective

The aim of this study was to **obtain direct sensory evaluations** of new terpene blends under development by Abstrax Tech.

More specifically, the objective was to obtain quantitative measures of the mood impressions produced by each blend. To that end, Synesthetics, Inc. had consumer panelists rate the blends using Mood Descriptor Profiling, a technique proven in previous applications to provide **results that are both sensitive and reliable**.

Protocol

administrator, sample bottles, and test materials were hidden from the panelist behind a white screen placed on the tabletop.

After reviewing and signing the consent form, the panelist rated the samples using a Mood Descriptor Profiling (MDP) ballot.

Panelists rated each sample blind—that is, without being provided a product name or any other description of the intended mood profile. Sample ballots were code-numbered, and presentation order of samples was randomized for each panelist.

Panelists rated each sample by distributing 5 "points" across a list of 11 mood descriptors, listed in alphabetical order. This point distribution technique is based on a method developed by Rader and Tellegen (1987) and used by Gilbert, Martin and Kemp (1996) to quantify the correspondence between color and odor. Since then, Synesthetics, Inc. has used MDP many time to profile mood impressions of scents being developed by its clients for a variety of aromatherapy-related applications.

Five Abstrax AI Terp Effects blends were tested. For convenience we refer to them by the labels initially provided by Abstrax.

Abstrax AI Terp Effects Blends

Relaxed   **Energized**   **Peaceful**

Inspired   **Focused**

Participants were recruited from the investigator's database of previous test subjects and from postings on local social media.

Panelists were tested one at a time in a session that lasted 10 to 15 minutes and that was conducted in a well-ventilated 138 square foot room in a commercial office rental building in Fort Collins, Colorado. The test

11 Mood States

Anxious   **Energized**   **Sad**

Calm   **Focused**   **Tired**

Creative   **Irritated**   **Uplifted**

Distracted   **Restful**

The study protocol (IRB® Study #1315043) was approved by WCG-IRB in Puyallup, Washington on August 9, 2021, as was the consent form.
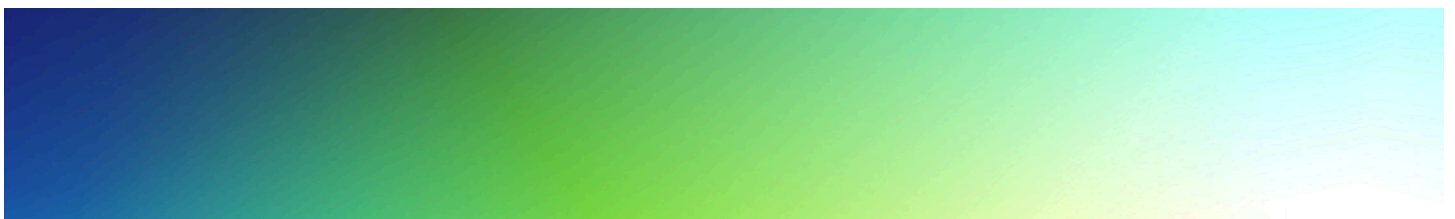
The Results

Thirty panelists were tested (16 men, 14 women). They ranged in age from 21 to 45 with a mean of 30.5 ± 7.2 years.

Mean point scores were calculated across moods for each sample. Past experience with the 5-point technique of Mood Descriptor Profiling has shown that mean scores of 0.90 or greater (i.e., twice the score expected on the basis of random descriptor assignment) are statistically robust. That is, descriptors ≥ 0.90 will replicate on re-testing of the same panelists, and in further testing with new panels. Other high-scoring descriptors (in the 0.75 to 0.90 range) will also remain high-scoring although with some variability in mean values and rank order.
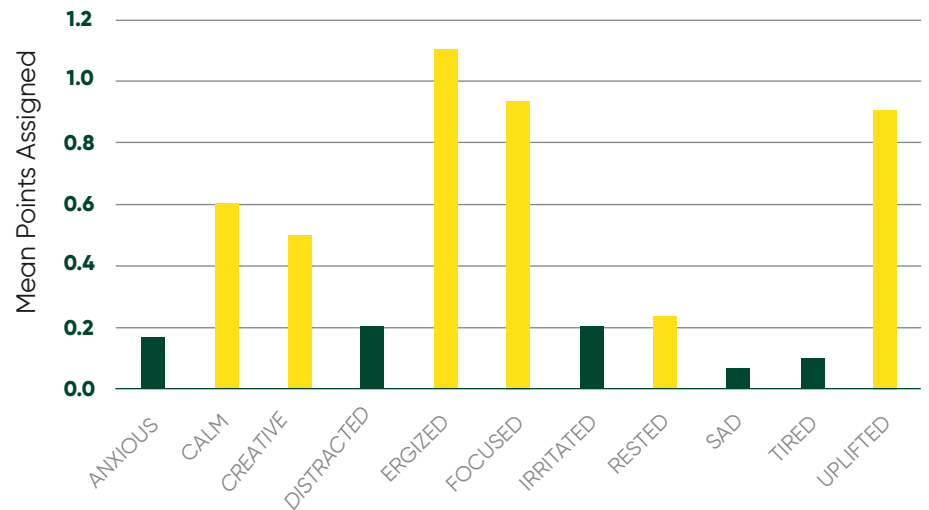
In the charts that follow, **positive mood states** are shown in **yellow** and **negative mood states** in **green.**

PEACEFUL

This blend had very strong scores on **energized, focused, uplifted.**
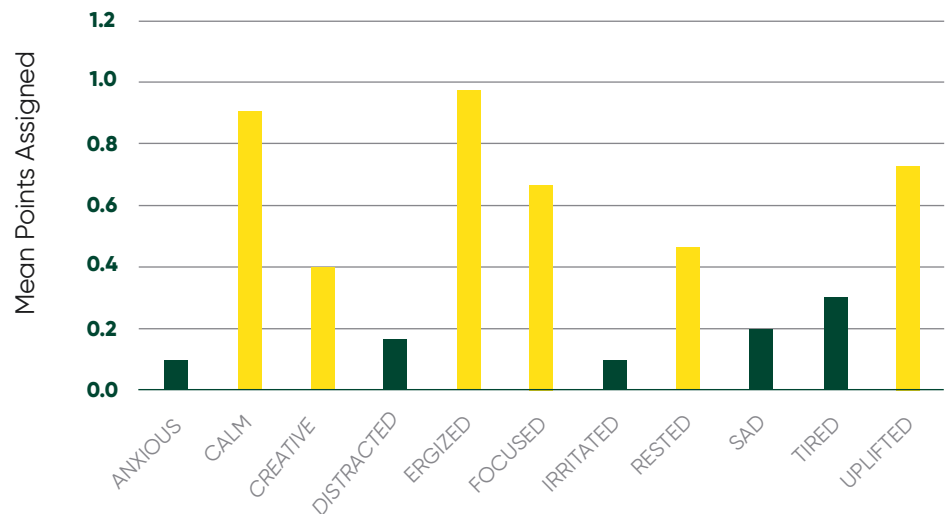
Sample: Peaceful

INSPIRED

This blend produced a very strong impression of **energized** and **calm**, secondary impression of **uplifted**.
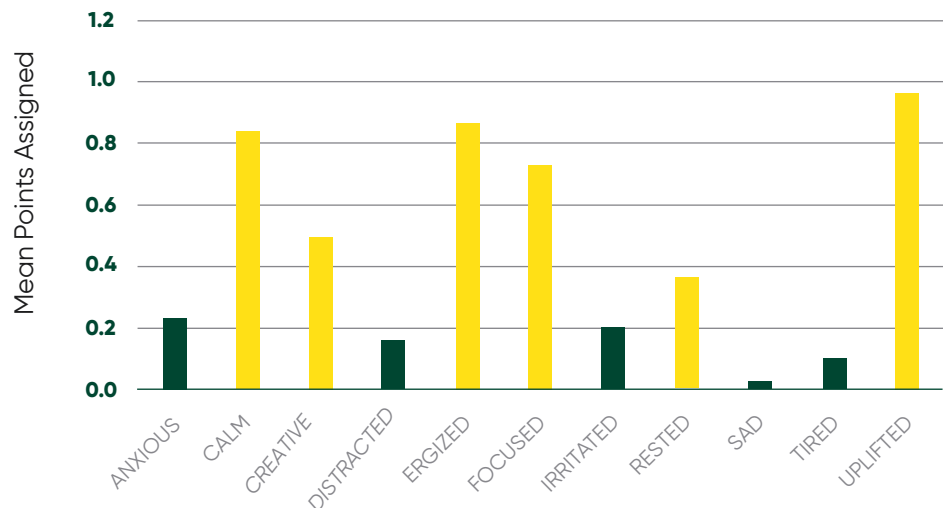
Sample: Inspired

FOCUSED

This blend gave a very strong impression of **uplifted.** It produced secondary impressions of **energized** and **calm**.
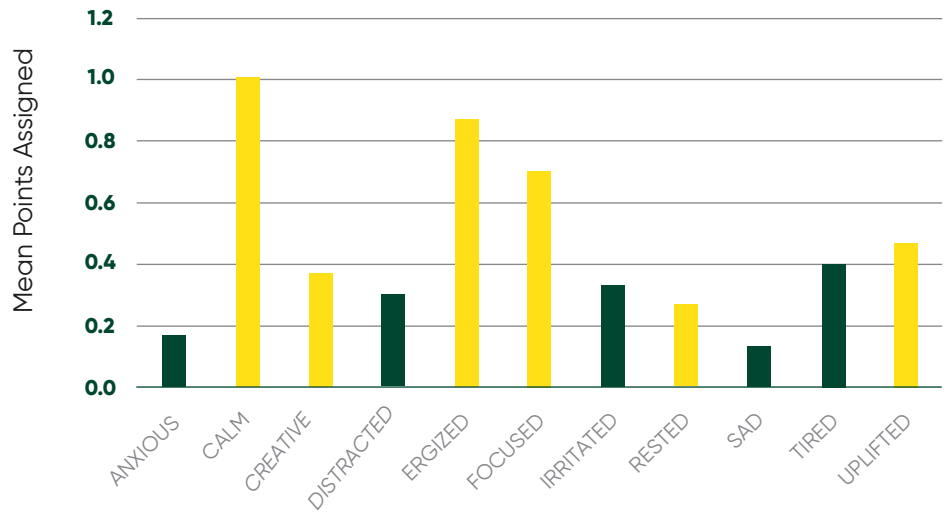
Sample: Focused

ENERGIZED

This blend yielded a very strong impression of **calm**, a secondary impression of **energized**, and a lesser impression of **focused**.
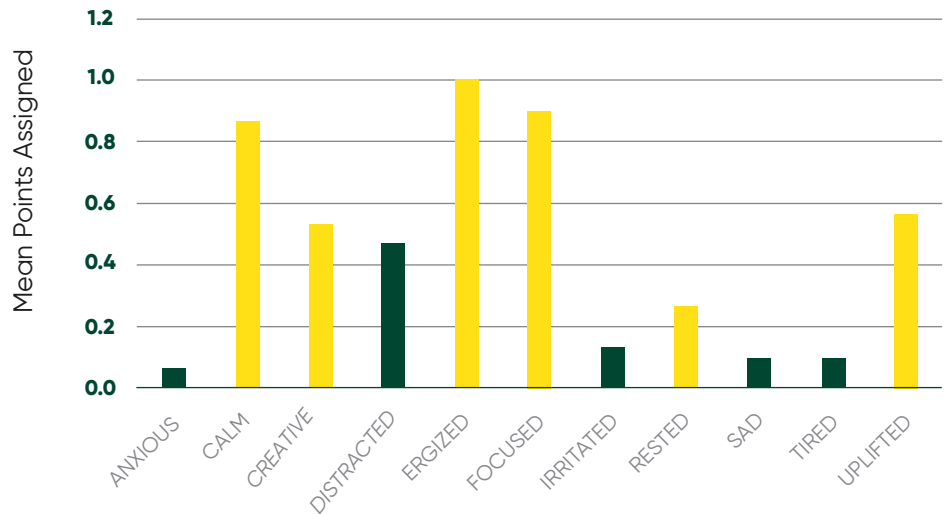
Sample: Energized

Mean Points Assigned

RELAXED

This blend produced very strong impressions of **energized** and focused, with a secondary impression of **calm**.

Sample: Relaxed

Mean Points Assigned

SUMMARY TABLE: MEAN MOOD DESCRIPTOR PROFILING SCORES (N = 30)

FOCUSED		INSPIRED		ENERGIZED		PEACEFUL		RELAXED	
UPLIFTED	0.97	ENERGIZED	0.97	CALM	1.00	ENERGIZED	1.10	ENERGIZED	1.00
ENERGIZED	0.87	CALM	0.90	ENERGIZED	0.87	FOCUSED	0.93	FOCUSED	0.90
CALM	0.83	UPLIFTED	0.73	FOCUSED	0.70	UPLIFTED	0.90	CALM	0.87
FOCUSED	0.73	FOCUSED	0.67	UPLIFTED	0.47	CALM	0.60	UPLIFTED	0.57
CREATIVE	0.50	RESTFUL	0.47	TIRED	0.40	CREATIVE	0.50	CREATIVE	0.53
RESTFUL	0.37	CREATIVE	0.40	CREATIVE	0.37	RESTFUL	0.23	RESTFUL	0.27
ANXIOUS	0.23	TIRED	0.30	IRRITATED	0.33	DISTRACTED	0.20	DISTRACTED	0.47
IRRITATED	0.20	SAD	0.20	DISTRACTED	0.30	IRRITATED	0.20	IRRITATED	0.13
DISTRACTED	0.17	DISTRACTED	0.17	RESTFUL	0.27	ANXIOUS	0.17	SAD	0.10
TIRED	0.10	IRRITATED	0.10	ANXIOUS	0.17	TIRED	0.10	TIRED	0.10
SAD	0.03	ANXIOUS	0.10	SAD	0.13	SAD	0.07	ANXIOUS	0.07

General Discussion

A guiding principle behind Mood Descriptor Profiling is that both negative and positive mood states should be assessed. Inclusion of negative moods allows for the expression by panelists of unfavorable responses to a given sample, even in the absence of direct hedonic ratings. In this study, five negative moods were included on the ballot: anxious, distracted, irritated, sad, and tired. Past experience with MDP has shown that unbalanced aromas (e.g., formulations in which a particular component "sticks out" from the rest), and aromas that are too aggressive or intense, score high on negative moods, especially on irritated. In this study, all five Abstrax samples had uniformly low scores across the negative moods—the highest individual score was a 0.47 on distracted for the Relaxed aroma. From a product development perspective, these results indicate that the aromas of the Abstrax AI Terp Effects blends are remarkably consumer friendly.

Conversely, all five Abstrax blends displayed very strong impressions on one or more of the six positive moods. High scores were consistently achieved for energized, calm, uplifted, and focused. Across blends, restful received the lowest score among the positive moods and a top rating of only 0.47 for the Inspired blend. The mood creative scored somewhat higher.

In previous MDP studies, high scores on positive moods have been used to select trial formulations for further development and/or market launch. This is especially the case when the high-scoring moods align with mood directions established in the product development brief. Based on the consistent pattern in the results of high scores on desirable mood states, it appears that the Abstrax AI Terp Effects aromas produce strong and favorable mood impressions on consumers. They are all strong candidates for further evaluation in specific product formulations.

Finally, it should be noted that the mood profiles produced by the Abstrax AI Terp Effects blends are not easily achieved. In Synesthetics, Inc.'s experience with aromatherapy-type product development, it is not sufficient that a scent be pleasant and attractive; only specific fragrance directions produce mood impressions of energized or calm.

Transforming the Conversation about Terpenes and Mood

This study is the first to directly assess the mood impressions produced by cannabis-relevant terpene blends. The results demonstrate these Abstrax blends are **effective at producing positive mood** impressions such as **energized, calm, uplifted, and focused**. The results also set a new standard for assessing terpene effects on mood in the context of cannabis. While much has been written about the entourage effect, empirical data linking terpenes to mood and mental state are in short supply. This study demonstrates that instead of speculating based on personal experience, it is possible to objectively quantify the association between moods and terpenes.

About
Dr. Avery Gilbert

Based in Fort Collins, Colorado, Avery has established himself as a leading authority on the measurement of cannabis aroma. He has published three scientific studies on cannabis aroma using consumer sensory panelists and has a fourth study submitted for publication.

Before exploring the scent of cannabis, Avery worked in the fragrance and flavor field at Givaudan Fragrances and as an independent scientific consultant for companies developing scented consumer products in a range of categories—including perfume, air fresheners, candles, and personal care products. He is the author of **What the Nose Knows: The Science of Scent in Everyday Life**, and is frequently cited in the media.

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