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THE NEUROGENETIC ARCHITECTURE OF SOCIAL GROUPS: INTEGRATING GROUP DYNAMICS AND BIOLOGICAL STRESS PREDISPOSITIONS

S.Surya, Dr.Asha Sundaram, Dr.Thangamayan.S
Research Scholar,Principal and professor,Associate professor
Saveetha school of law,SIMATS,Chennai
Mailid:162513003.ssl@saveetha.com,lawdirector@gmail.com,
Thangamayans.ssl@saveetha.com

ABSTRACT

The study of intergroup relations begins with an understanding of the group itself.Ageneral genetic testing of stress genes has been carried out through neuro genetic profiling, where the relational aspects of stress variations between people has been understood in terms of stress predispositions and epigenomics in terms to measure the stress factors in the individual when with groups under stress which are caused through conflicts, thus with basic epicentres indicators that directly or indirectly affect the genes internally through stress factors has been ideated and in this research the supportive categorisation of theory related to group dimensions and conflicts has been analysed.the derivation of standard stress scales seems to help in determining the standard stress
level formula to categorise people based on their stress health and variance towards them could help us in understanding their health which was proposed with INGCPT AND SEETHA framework along with neurogenetic profiling of humans that can address the stress of the employee in the organisations. In this study various group settings and related theories from literature has been analysed with support of emotional indicators to adopt the steps involved in invented INGCPT-SEETHA INVENTED NEUROGENETIC PROFILING PROCESS.

Keywords: Neurogenetics, ingcpt-seetha framework,varna-neurogenetics matrix,Neuroscience,

INTRODUCTION

A group is not merely a random collection of individuals; it is a complex social system governed by a web of psychological forces and interactions. This system of behaviours and psychological processes is known as group dynamics. It involves the influence of personality, power, and behavior on the group process, operating under the foundational premise that "the whole is greater than the sum of its parts". This chapter lays the groundwork for understanding intergroup relations by dissecting the fundamental nature of groups, exploring the invisible structures that guide their evolution, and examining the profound influence they exert on their members.

The Essence of a Group: Definition and Importance

At its core, a group consists of two or more individuals who share common values and norms, engaging in interconnected social roles through continuous interaction. This interdependence is central; the behaviors, attitudes, and experiences of each member are collectively influenced by the other members of the group. The term "group dynamics," coined by the social psychologist Kurt Lewin, describes the way groups and individuals act and react to changing circumstances, emphasizing the positive and negative forces at play within these collectives.

Groups can be broadly categorized as either formal or informal.

- Formal groups are intentionally created and structured to pursue a specific task or organizational goal. Examples include workplace teams, project committees, and educational institutions. Their structure, roles, and rules are explicitly defined.
- Informal groups emerge naturally and spontaneously from shared interests, social needs, or personal relationships. Social clubs, friendship circles, and community gatherings are examples of informal groups. Their norms and roles are often implicit and more flexible.

Understanding group dynamics is of paramount importance because groups are an inevitable and powerful aspect of human existence. They exert a strong influence on individuals, shaping their thoughts, feelings, and actions. This influence can generate both highly positive outcomes, such as synergy and collective achievement, and deeply negative ones, including conflict, prejudice, and flawed decision-making. A well-researched understanding of these dynamics allows for the cultivation of positive group behaviors and the mitigation of destructive tendencies.

The Life Cycle of a Group: Stages of Group Development

Groups are not static entities; they are dynamic and evolve over time through a series of predictable stages. This evolution involves changes in relationships, tasks, and structure.

Several models have been proposed to map this developmental journey, with two of the most prominent being those developed by Bruce Tuckman and by Garland, Jones, and Kolody.

Tuckman's Five-Stage Model of Group Development

Bruce Tuckman's model, first proposed in 1965 and later updated, outlines five distinct stages that groups typically progress through: Forming, Storming, Norming, Performing, and Adjourning. This framework explains that as a team matures, relationships stabilize, and the required leadership style shifts from directive to more collaborative.

1. Forming: This is the initial orientation stage where group members first come together. Behavior is characterized by politeness, caution, and a degree of anxiety about acceptance and individual roles. Members are dependent on a leader for guidance and direction, and they tend to avoid controversy to ensure a sense of safety and approval. The primary task is to define the group's goals, structure, and roles. While members may feel excited and optimistic, there is also underlying uncertainty.
2. Storming: As the initial politeness fades, this stage is marked by conflict, competition, and power struggles. Members begin to assert their individual opinions and styles, which can lead to disagreements about goals, procedures, and leadership. This phase can be uncomfortable and may cause some members to feel defensive or lose interest. However, it is a critical stage where the group learns to handle conflict and negotiate roles. For the group to progress, members must transition from a "testing and proving" mentality to a problemsolving one, which requires the ability to listen to differing perspectives.
3. Norming: If the group successfully navigates the storming stage, it enters the norming phase, where conflicts are resolved and a sense of cohesion and unity emerges. Trust and respect develop among members, and they establish shared rules, values, and norms of behavior. Leadership becomes more shared, cliques dissolve, and communication becomes more open and constructive. The group's focus shifts back to the task at hand, with a newfound ability to collaborate effectively.
4. Performing: At this stage, the group is fully functional, mature, and operates with a high degree of autonomy and efficiency. Members are interdependent, roles are clear and flexible, and the group's

energy is directed toward achieving its goals. Problem-solving is a collaborative effort, and the group can manage its own processes with minimal supervision. Not all groups reach this stage, but those that do exhibit high levels of productivity, commitment, and creativity.

5. Adjourning: This final stage, added by Tuckman in 1977, involves the termination of the group after its tasks are completed. This phase is characterized by a mix of emotions, including a sense of accomplishment and pride, as well as sadness or anxiety about the group's dissolution. The group's focus is on completing any remaining tasks, reflecting on its achievements and challenges, and managing the disengagement process.

LITERATURE REVIEW Garland, Jones, and Kolody's Model

This model, often used in social work contexts, focuses more on the emotional journey and evolving intimacy among group members. It outlines five stages that parallel Tuckman's model but with a greater emphasis on the members' internal experiences.

1. Pre-affiliation: Members are ambivalent about joining and interactions are guarded and superficial.
2. Power and Control: Members vie for position and influence, leading to conflicts.
3. Intimacy: Cohesion develops, and members share more personal information.
4. Differentiation: Members accept individual differences, leading to greater group functionality.
5. Separation: The group prepares for termination, reflecting on its journey.

A comparative analysis of these models reveals a common psychological trajectory: an initial period of uncertainty gives way to conflict, which, if resolved, leads to cohesion and, ultimately, effective performance. This developmental path is not just a descriptive curiosity; it carries significant implications for how groups should be led. The failure of a group to progress can often be traced to a mismatch between its developmental stage and the leadership style being applied. For instance, a highly directive leader may be essential during the 'Forming' stage to provide structure, but that same style can stifle a group trying to enter the 'Performing' stage, where autonomy and shared leadership are needed. Effective leadership, therefore, is not a static set of traits but a dynamic process of adapting one's approach to the evolving needs of the group.

Table 1.1: A Comparative Overview of Group Development Models

Stage Number	Tuckman's Stage	Key Characteristics (Tuckman)	Garland, Jones, & Kolody's Stage	Key Characteristics (G, J, & K)
1	Forming	Dependence on leader, politeness, anxiety, defining tasks.	Pre-affiliation	Ambivalence, guarded relationships, superficial interaction.

2	Storming	Conflict, power struggles, competition, challenging authority.	Power and Control	Vying for position, struggles for dominance, conflict.
3	Norming	Cohesion, trust, establishing norms, shared leadership.	Intimacy	Deeper relationships, more personal sharing, group cohesion.
4	Performing	High productivity, autonomy, interdependence, flexible roles.	Differentiation	Acceptance of individual differences, enhanced group function.
5	Adjourning	Task completion, reflection, emotional responses to ending.	Separation	Preparation for termination, reflecting on achievements.

The Unseen Blueprint: The Impact of Norms and Roles

Every group operates according to an unseen blueprint composed of norms and roles. These structural elements provide predictability, regulate behavior, and are essential for a group's ability to function effectively.

Group Norms are the informal, often unwritten, rules and shared expectations that govern the behavior of group members. They provide direction, reduce uncertainty, and organize social interactions. Norms can be categorized in several ways:

- Prescriptive Norms: Define what members should do (e.g., "be on time for meetings").
- Proscriptive Norms: Define what members should not do (e.g., "do not interrupt others"). ● Descriptive Norms: Reflect what members typically do (e.g., "most people leave work at 5 PM").
- Injunctive Norms: Specify what behaviors are approved or disapproved of (e.g., "it is good to help a colleague").

Norms are enforced through social sanctions, such as approval for conformity and disapproval or even exclusion for deviance. While they are crucial for maintaining order and cohesion, they can also

exert powerful pressure to conform, potentially stifling individual creativity and dissent. Group Roles are the sets of expected behaviors associated with a particular position or function within a group. Like norms, roles provide structure and predictability. They can be formally assigned (e.g., "team leader," "secretary") or emerge informally through group interaction. Roles are often differentiated into three main types:

- Task Roles: These are functions focused on achieving the group's goals, such as the coordinator (organizing work), the information seeker (asking for facts), or the critic (evaluating ideas).
- Relationship (or Socioemotional) Roles: These roles focus on maintaining the group's interpersonal and emotional well-being. Examples include the harmonizer (mediating conflicts), the encourager (providing positive feedback), and the compromiser.
- Individual Roles: These are self-centered roles that can be disruptive to the group, such as the blocker (resisting ideas) or the dominator (asserting authority).

Together, norms and roles create the social structure of a group, guiding how members interact, make decisions, and work towards their objectives.

The Collective Mind: Group Decision-Making Processes

A primary function of many groups is to make decisions. The process of group decision-making is typically more complex than individual decision-making, involving a sequence of steps from identifying the problem to evaluating the outcome. To improve the quality of these decisions and overcome common pitfalls, several structured techniques have been developed.

- Brainstorming: A technique designed to generate a large number of ideas in a short period. The core principle is to defer judgment; criticism is withheld to encourage a free flow of creative and unconventional thoughts.
- Nominal Group Technique (NGT): This is a more structured process where members first generate ideas independently and in writing. Each member then presents one idea to the group in a round-robin fashion until all ideas are shared. The group then discusses and ranks the ideas to reach a decision. NGT ensures that all members have an equal opportunity to contribute, preventing more vocal members from dominating the discussion.
- Delphi Technique: This method is used to achieve consensus among experts who are not physically in the same location. It involves a series of questionnaires sent to the experts, who remain anonymous to each other. After each round, a facilitator provides a summary of the results, allowing the experts to revise their opinions based on the group's collective feedback. The process continues until a consensus is reached.

While group decision-making has several advantages, such as access to more information and a greater diversity of perspectives (synergy), it also has significant disadvantages. It is generally more time-consuming than individual decision-making and can be fraught with interpersonal conflict. One of the most dangerous pitfalls is a phenomenon known as groupthink.

Coined by social psychologist Irving Janis, groupthink is a mode of thinking that occurs when the desire for harmony and consensus in a cohesive group overrides a realistic appraisal of alternative courses of action. It is a process of flawed decision-making where group members sacrifice critical thinking to maintain unity. Janis identified eight key symptoms of groupthink :

1. Illusion of Invulnerability: The group feels overly optimistic and is willing to take extraordinary risks.

2. Collective Rationalization: The group discounts warnings and fails to reconsider its assumptions.
3. Belief in Inherent Morality: Members believe in the rightness of their cause and ignore the ethical or moral consequences of their decisions.
4. Stereotyped Views of Out-groups: The group holds negative and stereotyped views of its opponents.
5. Direct Pressure on Dissenters: Members are under pressure not to express arguments against any of the group's views.
6. Self-Censorship: Members withhold their dissenting views to avoid deviating from the group consensus.
7. Illusion of Unanimity: The majority view and judgments are assumed to be unanimous.
8. Self-Appointed Mindguards: Members protect the group and its leader from information that is problematic or contradictory to the group's cohesiveness and views.

   Groupthink is not simply poor decision-making; it is a pathology that arises directly from specific group dynamics. The very cohesion that allows a group to reach the 'Norming' and 'Performing' stages can, under certain conditions, become its greatest vulnerability. When a highly cohesive group faces a stressful decision and lacks impartial leadership or clear procedures for debate, the pressure to maintain consensus can become so overwhelming that it silences dissent and critical evaluation. This transforms cohesion from a strength into a weakness, leading to catastrophic failures. The goal, therefore, is not merely to build a cohesive team, but to build a critically cohesive team—one that has mechanisms in place to encourage and protect dissenting viewpoints.

   Case Study in Depth: The Challenger Disaster and the Perils of Groupthink

   The 1986 Space Shuttle Challenger disaster serves as a tragic and powerful real-world case study of groupthink in action. On January 28, 1986, the shuttle broke apart 73 seconds after liftoff, killing all seven crew members. The subsequent investigation by the Rogers Commission revealed that while the technical cause was the failure of an O-ring seal in a solid rocket booster, a "highly flawed decision process was an important contributing cause of the disaster". An analysis of the events leading up to the launch reveals a textbook case of groupthink, with multiple symptoms present in the decision-making process at NASA and its contractor, Morton Thiokol.

- Intense Pressure for Consensus: NASA was under immense external pressure to maintain its ambitious launch schedule. The agency's credibility was on the line, as it had promised a much higher frequency of flights than it was delivering. Furthermore, there was political pressure, as President Ronald Reagan was expected to mention the launch in his State of the Union address that evening. This created a powerful incentive for NASA managers to push for a "go" decision, framing any delay as a failure.
- Collective Rationalization and Discounting Warnings: On the night before the launch, engineers from Morton Thiokol warned that the cold temperatures forecast for the morning (36°F) were far below the tested safety range for the O-rings (53°F). However, NASA managers dismissed these clear and data-based warnings. They engaged in collective rationalization, arguing that the secondary O-ring would provide a backup and pointing to previous successful launches in cool (though not as cold) weather as evidence that the risk was acceptable. This mindset of "hear no evil, see no evil, speak no evil" allowed them to ignore a critical safety threat.

- Direct Pressure on Dissenters: When Thiokol engineers initially refused to approve the launch, NASA officials expressed frustration and disbelief. During a private caucus at Thiokol, a senior manager, Jerald Mason, famously turned to his vice president of engineering, Roger Lund, and told him to "take off his engineering hat and put on his management hat". This was a clear and direct application of pressure, urging Lund to prioritize business and client relationships over the stark engineering data.
- Self-Censorship and the Illusion of Unanimity: The pressure on Thiokol's management led to self-censorship among the engineers. Those who still had doubts did not voice them forcefully after their initial concerns were dismissed. Ultimately, Thiokol's management reversed its initial "no-go" recommendation. This final decision was then presented to NASA as a unanimous approval, creating an illusion of unanimity that masked the intense conflict and doubt that had occurred just moments before. The Challenger tragedy illustrates how a group of highly intelligent and capable experts can make a catastrophic decision when group dynamics foster a premature drive for consensus. Had NASA and Thiokol implemented procedures to prevent groupthink—such as appointing a devil's advocate, seeking outside expert opinions, or having the leader withhold their own opinion at the outset—it is possible that the engineers' warnings would have been heeded and the disaster averted.

The Individual in the Crowd: Influence of Group Dynamics on Behavior

The power of the group extends beyond its formal decisions to fundamentally shape the behavior of its individual members. This influence manifests in several key ways, including conformity, changes in individual effort, and a loss of self-awareness.

Conformity

Conformity is the tendency for individuals to align their attitudes, beliefs, and behaviors with group norms. The classic experiments conducted by Solomon Asch in the 1950s provide a stark demonstration of this phenomenon.

- Asch's Experiment: In the study, a single naive participant was placed in a group with several confederates (actors). The group was asked to perform a simple perceptual task: judging which of three comparison lines was the same length as a target line. The answer was always obvious. However, on 12 "critical trials," the confederates unanimously gave the same, clearly incorrect answer. Asch wanted to see if the real participant would stick to their own perception or conform to the incorrect majority.
- Findings: The results were striking. About 75% of participants conformed to the incorrect group answer at least once. Across all critical trials, the average conformity rate was approximately 32%. In a control group where participants made judgments alone, the error rate was less than 1%, demonstrating that the task itself was not difficult.
- Drivers of Conformity: Post-experiment interviews revealed two primary reasons for this conformity:

1. Normative Social Influence: Most participants conformed because they wanted to fit in with the group and feared the social disapproval or ridicule that might come from being the lone dissenter. They did not actually believe the group's answer was correct but went along with it publicly. 2. Informational Social Influence: A smaller number of participants began to doubt their own perceptions. They reasoned that if a whole group of people saw it differently, they must be the ones who were wrong. They conformed because they believed the group was better informed. Asch's work demonstrates the powerful, and often uncomfortable, pressure that groups can exert on

individuals, sometimes leading them to deny the evidence of their own senses.

Social Facilitation and Social Loafing

The mere presence of others can also alter an individual's performance on a task, but the effect can go in two opposite directions.

- Social Facilitation: This is the tendency to perform simple or well-learned tasks better in the presence of others. The presence of an audience or co-actors increases physiological arousal, which enhances performance on dominant (easy) responses but can impair performance on complex or new tasks.
- Social Loafing: This is the tendency for individuals to exert less effort when working collectively as part of a group compared to when working alone. This often occurs because of a diffusion of responsibility, where individuals feel less accountable for the final product.

Deindividuation

In some group settings, particularly those that are large and anonymous, individuals can experience deindividuation—a loss of self-awareness and personal identity. This psychological
state can lower inhibitions and lead to impulsive, deviant, or even violent behavior that individuals would not engage in on their own. The anonymity of a crowd can make people feel less accountable for their actions, contributing to behaviors seen in mobs or riots.

The Art of Influence: A Deep Dive into Leadership

While group dynamics describe the forces within a collective, leadership is the process of harnessing and directing those forces. It is the art of influencing a group to move toward the achievement of its goals. This chapter moves from the group as a whole to the pivotal role of the individual who guides it, exploring the multifaceted nature of leadership, the various styles leaders employ, and the powerful impact of context, gender, and culture.

Defining Leadership: Power, Persuasion, and Process

Leadership is not a formal title or a position of authority, but rather a dynamic process of social influence. It is a set of mindsets and behaviors that aligns people in a collective direction, enables them to work together to accomplish shared goals, and helps them adjust to changing environments. This influence can be formal, stemming from a designated role (e.g., a CEO or manager), or informal, emerging organically from an individual's ability to inspire and guide their peers.

A crucial distinction exists between leadership and management. While the two functions can overlap, they are conceptually distinct. Management is primarily concerned with complexity, order, and stability. Managers plan, budget, organize, and solve problems to ensure an organization runs smoothly. Leadership, in contrast, is about coping with change. Leaders set a vision for the future, align people with that vision through communication, and inspire them to overcome obstacles. In short, managers help people do things right, while leaders help people do the right things.

A Taxonomy of Leadership: From Autocratic to Transformational Styles

Over decades of research, numerous leadership styles have been identified, each with its own approach to decision-making, motivation, and group interaction.

Kurt Lewin's Foundational Three Styles

In the 1930s, Kurt Lewin and his colleagues identified three fundamental leadership styles that remain a cornerstone of leadership theory.

- Autocratic (or Authoritarian) Leadership: The leader makes decisions unilaterally, with little to no input from the group. This style centralizes control and allows for quick decisionmaking, which can be effective in crises or when the leader possesses unique expertise. However, it often leads to lower morale, stifled creativity, and resentment among team members.
- Democratic (or Participative) Leadership: The leader involves group members in the decision-making process, encouraging collaboration and seeking input. While this approach can be slower, it typically results in higher job satisfaction, greater commitment to decisions, and more innovative solutions.
- Laissez-Faire Leadership: This is a hands-off style where the leader provides the team with freedom to make their own decisions and manage their own work. It can foster autonomy and creativity, but it is only effective with highly skilled and self-motivated teams. Without this, it can lead to a lack of direction, low productivity, and chaos.

  Transactional vs. Transformational Leadership

  Two of the most widely discussed modern leadership theories are transactional and transformational leadership, which represent different approaches to motivation and engagement.
- Transactional Leadership: This style operates on a system of exchange, using rewards and punishments to motivate followers. The leader clarifies roles and task requirements, and provides rewards (e.g., bonuses, praise) for meeting goals and applies

consequences for failing to do so. It is a "give and take" approach focused on maintaining the smooth functioning of the organization and achieving short-term objectives.

- Transformational Leadership: This style focuses on inspiring and empowering followers to achieve a shared, long-term vision. Transformational leaders act as role models, encourage innovation, and attend to the individual developmental needs of their followers. They elevate the interests of their team, fostering a sense of collective purpose and motivating people to perform beyond their own expectations.

  Other Key Leadership Styles

  Beyond these major categories, several other distinct styles are recognized:
- Servant Leadership: This style flips the traditional hierarchy, with the leader's primary focus being on the well-being and growth of their team members. The leader serves the team, empowering them and ensuring their needs are met.
- Bureaucratic Leadership: This is a "by-the-book" style where the leader relies on established rules, policies, and procedures to direct the group. It ensures consistency and can be effective in highly regulated environments, but it is often rigid and slow to adapt.
- Coaching Leadership: This leader focuses on the personal and professional development of each team member, helping them identify their strengths and weaknesses and improve their skills.

  Evaluating Effectiveness: Situational and Theoretical Models

  The ongoing debate about which leadership style is "best" has largely been resolved by a consensus that effectiveness is context-dependent. A leadership style that works in one situation may fail in another. This has given rise to several contingency and situational theories of leadership.
- Rensis Likert's Four Systems of Management: Likert proposed that management styles exist on a continuum from highly controlling to highly collaborative. System 1 (Exploitative Authoritative) uses fear and threats. System 2 (Benevolent Authoritative) uses rewards but remains top-down. System 3

(Consultative) seeks input from employees but retains final authority. System 4 (Participative Group) is the most effective, according to Likert, and involves genuine group participation in decision-making and goal-setting.

- Path-Goal Theory: Developed by Robert House, this theory suggests that a leader's primary job is to clarify the "path" for followers to achieve their "goals." The leader must adapt their style to fit the characteristics of the followers and the work environment. The theory outlines four leadership styles—Directive (for ambiguous tasks), Supportive (for stressful or tedious tasks), Participative (for complex tasks where follower input is valuable), and AchievementOriented (for challenging tasks where followers are motivated).
- William Reddin's 3-D Leadership Model: Reddin's model adds a crucial third dimension—effectiveness—to the two dimensions of task-orientation and relationship-orientation. He argued that any style could be effective or ineffective depending on the situation. For example, a high-task, low-relationship style is effective in a situation that demands it (a "Benevolent Autocrat"), but ineffective in a situation that requires a more people-oriented approach (an "Autocrat").

This consistent theme across multiple theories—the rejection of a one-size-fits-all approach—is a central finding in leadership studies. The effectiveness of any leader is not determined by a fixed set of traits but by their ability to diagnose a situation and deploy the appropriate behaviors. This makes leadership a complex equation involving the leader's style, the followers' needs and maturity, the demands of the task, and the broader organizational and cultural context. The focus of leadership development, therefore, should shift from asking "Who is a good leader?" to "When and where is a particular leadership approach effective?"

Leadership in Action: Profiles of Historical and Contemporary Leaders

Theories of leadership come to life when examined through the actions of real-world figures. The styles of famous leaders provide concrete illustrations of these abstract concepts.

Table 2.1: Key Leadership Styles: Characteristics, Effectiveness, and Examples

Leadership Style	Core Characteristics	Best Suited For (Context)	Potential Pitfalls	Real-World Example (Leader)
Transformational	Visionary, inspiring, empowering, intellectually stimulating.	Environments requiring innovation, change and high commitment.	Can overlook details, risk of burnout for followers.	Elon Musk (Tesla, SpaceX)
Autocratic	Centralized control unilateral decision-making, directive.	Crisis situations, teams with low skill/motivation, military.	Lowers morale, stifles creativity, creates dependency.	Margaret Thatcher

Democratic	Collaborative, seeks input, shared decision-making.	Creative fields, complex problemsolving, fostering team buyin.	Can be slow, may lead to compromises that are not optimal.	Tim Cook (Apple)
Transactional	Uses rewards and punishments, clarifies roles, monitors performance.	Structured environments with clear goals and processes (e.g., sales).	Limits innovation, motivation is extrinsic, can feel impersonal.	Sir Alex Ferguson (Manchester United)
Servant	Prioritizes team well-being, empathetic, focuses on service.	Non-profits, healthcare, education, building a strong culture.	Can be seen as lacking authority, may struggle with tough decisions.	Nelson Mandela
Laissez-Faire	Hands-off, delegates authority, provides autonomy	Highly skilled, expert, and self motivated teams.	Lack of direction, low accountability, potential for chaos.	(Often cited in creative or research-based teams)

The Gendered Lens: Deconstructing Stereotypes and Styles in Leadership

Gender plays a significant role in the perception, practice, and evaluation of leadership. Historically, leadership has been associated with stereotypically masculine traits like assertiveness and dominance, creating systemic barriers for women.

Research consistently shows that, overall, men and women are equally effective as leaders. However, there are observable differences in the styles they tend to adopt. Meta-analyses have found that women are more likely than men to use democratic or participative styles and to exhibit transformational leadership behaviors. Conversely, men are slightly more likely to use autocratic or directive styles and to manage through a transactional approach. These findings create a complex dynamic. The very styles that women are more inclined to use—transformational and democratic—are often identified as being highly effective in modern, collaborative organizations. Yet, women in leadership face a "double bind" rooted in societal stereotypes. If a female leader adopts a stereotypically "masculine" assertive style, she risks being perceived as abrasive or "bossy." If she adopts a more stereotypically "feminine" collaborative style, she may be seen as weak or not a "true" leader. This suggests that the primary barrier for women is not a lack of capability or an ineffective

leadership style, but rather the biased perceptions and evaluations they face. This is further compounded by systemic issues like the "glass ceiling"—an invisible barrier preventing advancement—and the "glass escalator," where men in female-dominated professions are often fast-tracked to leadership roles.

The Cultural Compass: How Societal Values Shape Leadership

Leadership does not exist in a vacuum; it is profoundly shaped by the cultural context in which it is practiced. What is considered effective leadership in one country may be seen as ineffective or even inappropriate in another. Geert Hofstede's Cultural Dimensions Theory provides a powerful framework for understanding these differences.

- Power Distance: This dimension reflects the degree to which a society accepts and expects unequal power distribution. In high power distance cultures (e.g., Malaysia, Mexico), leaders are expected to be decisive and authoritative, and a top-down, autocratic style is common. In low power distance cultures (e.g., Denmark, Sweden), leaders are expected to be approachable and consultative, and a democratic, egalitarian style is preferred.
- Individualism vs. Collectivism: This dimension contrasts cultures that prioritize individual goals with those that prioritize group goals. In individualistic cultures (e.g., the United States), leadership often emphasizes personal achievement, autonomy, and direct communication. In collectivistic cultures (e.g., Japan, China), leadership is focused on group harmony, consensus-building, and preserving relationships. A participative style is often more effective in these contexts.
- Masculinity vs. Femininity: This dimension relates to a society's dominant values. Masculine cultures (e.g., Japan, Germany) value assertiveness, competition, and material success, favoring decisive and achievement-oriented leadership. Feminine cultures (e.g., Sweden, the Netherlands) value cooperation, modesty, and quality of life, preferring leaders who are supportive and consensus-oriented.
- Uncertainty Avoidance: This dimension measures a culture's tolerance for ambiguity and the unknown. High uncertainty avoidance cultures (e.g., Greece, Japan) prefer leaders who provide clear rules, structure, and stability. Low uncertainty avoidance cultures (e.g., Singapore, Denmark) are more comfortable with risk and ambiguity, and are more open to flexible, adaptive leadership styles.

Understanding these cultural dimensions is critical for leaders operating in a globalized world, as it allows them to adapt their style to meet local expectations and lead diverse teams more effectively.

'Us' vs. 'Them': Foundational Theories of Intergroup Relations

The relationship between different social groups is a central theme of social psychology. Why do groups so often come into conflict? Why do people feel such strong loyalty to their own group and, at times, such animosity toward others? This chapter explores the foundational theories that seek to explain the psychological roots of intergroup behavior, from competition over resources to the very nature of our social identity.

The Spark of Conflict: Realistic Group Conflict Theory

One of the most intuitive explanations for intergroup conflict is competition. Realistic Group Conflict Theory, developed by Muzafer Sherif, proposes that hostility, prejudice, and discrimination between groups arise when they are in competition for scarce and valuable resources. These resources can be material, such as territory, jobs, or wealth, or symbolic, such as political power or social status. When

groups have conflicting goals—where one group's success comes at the other's expense—a state of negative interdependence is created, leading to conflict. Crucially, the theory also offers a path to resolution: superordinate goals. These are shared goals that are compelling to both groups but cannot be achieved by either group alone. By forcing groups to cooperate and become positively interdependent, superordinate goals can reduce intergroup hostility and promote harmony.

Classic Experiment in Focus: The Robbers Cave Experiment

Sherif's theory was powerfully demonstrated in his now-famous Robbers Cave Experiment, a field study conducted in 1954 at a boys' summer camp. The study was conducted in three distinct phases:

1. Phase 1: Ingroup Formation. Twenty-two 11-year-old boys, all from similar backgrounds and previously unknown to each other, were divided into two groups. For the first week, the groups were kept separate and engaged in activities designed to build group cohesion, such as hiking and swimming. They quickly developed group identities, choosing names for themselves—the "Eagles" and the "Rattlers"—and creating group flags and norms.
2. Phase 2: Intergroup Conflict (The Friction Phase). The researchers then brought the two groups into direct competition with each other through a series of contests and games, with prizes awarded to the winning team. As predicted by Realistic Group Conflict Theory, this competition for scarce resources (prizes and status) led to a rapid escalation of hostility. The boys began with verbal insults and taunting, which soon spiraled into more direct aggression, including burning the other group's flag, raiding their cabin, and engaging in physical altercations. Prejudice was also evident, as boys rated members of their own group far more favorably than members of the outgroup.
3. Phase 3: Conflict Resolution (The Integration Phase). The researchers first tested the contact hypothesis by simply bringing the groups together in non-competitive settings (e.g., watching movies, eating meals). This contact did not reduce hostility; in fact, it often provided more opportunities for conflict. Next, the researchers introduced a series of superordinate goals. For example, they secretly sabotaged the camp's water supply and informed the boys that they all had to work together to fix it. In another instance, the camp truck "broke down," and all the boys were needed to pull it up a hill. As the groups were forced to cooperate to achieve these shared goals, the hostility between them gradually subsided. They began to mingle, share resources, and by the end of the camp, friendships had formed across group lines.

The Robbers Cave experiment provided compelling evidence that competition for resources breeds intergroup conflict, while cooperation toward superordinate goals can transform hostility into harmony.

The Perception of Injustice: Relative Deprivation Theory

While competition for tangible resources is a powerful driver of conflict, it is not the only one.

Relative Deprivation Theory proposes that conflict can also arise from the perception of injustice. This theory posits that feelings of discontent and grievance emerge not from one's absolute level of resources, but from the belief that one's group is unfairly disadvantaged compared to a relevant reference group. It is the gap between what people feel they deserve and what they actually have that fuels conflict.

A critical distinction is made between two types of deprivation:

- Egoistic Relative Deprivation: An individual's feeling of being unfairly treated compared to other individuals within their own group. This typically leads to individual actions to improve one's personal situation.
- Fraternal Relative Deprivation: The belief that one's entire group is unfairly disadvantaged compared to another group. This form of deprivation is a much more potent driver of collective action, social protest, and large-scale social movements.

The theory is powerfully illustrated by historical social movements :

- The American Civil Rights Movement: This movement was not simply a response to absolute poverty, but was fueled by a profound sense of fraternal relative deprivation. African Americans compared their systemic lack of access to quality education, voting rights, and public services to the privileges afforded to white society. The landmark lawsuit Brown v. Board of Education was a direct challenge to a system that created and perpetuated this state of relative deprivation, arguing that "separate educational facilities are inherently unequal".
- Major Revolutions: The French Revolution (1789), the Russian Revolution (1917), and the Egyptian Revolution (2011) were all, in part, explosive reactions to a sharp and widely perceived degree of inequality and injustice between the masses and the ruling elite.

The Core of Identity: Social Identity Theory (Tajfel & Turner)

Perhaps the most influential framework for understanding intergroup relations is Social Identity Theory (SIT), developed by Henri Tajfel and John Turner. The theory's central premise is that a significant part of our self-concept—our sense of who we are—is derived from our membership in social groups. Our self-esteem is therefore tied to the perceived status and success of these groups. This creates a powerful motivation to see our own groups in a positive light, often at the expense of other groups.

The process of social identification unfolds in three fundamental cognitive stages:

1. Social Categorization: We naturally and automatically categorize the social world into groups, just as we categorize physical objects. We classify ourselves and others into categories like nationality, gender, religion, or even fans of a sports team. This process simplifies our complex social environment.
2. Social Identification: We adopt the identity of the groups to which we belong. This is not just a cognitive label; it has emotional significance. We internalize the group's norms and values, and our self-esteem becomes linked to the group's fortunes. When our group succeeds, we feel pride; when it fails, we feel shame.
3. Social Comparison: To maintain a positive social identity and boost our self-esteem, we compare our own group (the in-group) with other groups (the out-groups). This comparison is inherently biased; we are motivated to find dimensions on which our in-group is superior, a concept known as achieving positive distinctiveness. This drive for positive distinctiveness is a key psychological mechanism underlying in-group favoritism, prejudice, and intergroup discrimination.

   Tajfel's minimal group paradigm experiments brilliantly demonstrated this process. He found that he could create intergroup bias by simply categorizing participants into arbitrary, meaningless groups (e.g., based on a coin toss or a preference for a particular painter). Even with no history of conflict, no interaction, and no competition for resources, participants would allocate more rewards to

anonymous members of their own group than to members of the out-group.

This finding delivered a profound challenge to Realistic Group Conflict Theory. While competition for resources can certainly cause conflict, it is not a necessary condition. The mere act of categorization into "us" and "them" is sufficient to trigger the psychological machinery of intergroup bias. This suggests that conflict is not always 'realistic' or rational; it can be purely psychological, driven by our fundamental need for a positive social identity. This has deep implications for conflict resolution, indicating that simply redistributing resources may not be enough to heal divides; issues of identity, status, and recognition must also be addressed.

The Cognitive Shift: Self-Categorisation Theory (Turner)

Building on the foundation of SIT, John Turner and his colleagues developed

Self-Categorisation Theory (SCT) to provide a more detailed cognitive explanation of how and when our sense of self shifts between a personal identity ("I") and a social identity ("we"). SCT proposes that the self exists at different levels of abstraction. The three primary levels are:

1. The personal self, where we see ourselves as unique individuals ("I" vs. "you").
2. The social self, where we see ourselves as members of an in-group in contrast to an outgroup ("we" vs. "they").
3. The human self, where we see ourselves as members of the human species ("we humans" vs. "animals").

The social context determines which level of self-categorization becomes salient (cognitively active). When a particular social identity becomes salient, a process of depersonalization occurs. This is not a loss of self, but a cognitive redefinition of the self. We cease to see ourselves as unique individuals and instead see ourselves as interchangeable representatives, or prototypes, of the social category. Our perceptions, beliefs, and behaviors become guided by the norms and stereotypes associated with that salient group identity.

This concept of a fluid, context-dependent identity provides a powerful psychological mechanism for both conflict and its resolution. The same process that leads to conflict when the salient identity is "us vs. them" (e.g., Eagle vs. Rattler) can lead to cooperation when the context shifts to make a more inclusive, superordinate identity salient (e.g., "we campers vs. the problem"). Conflict resolution, from this perspective, is an exercise in identity management—the art of making a shared, inclusive identity more salient than the conflicting subgroup identities.

Illustrative Concepts: In-Group Favoritism and Out-Group Homogeneity in Society The processes described by SIT and SCT manifest in two pervasive and observable social biases: ingroup favoritism and the out-group homogeneity effect.

- In-Group Favoritism: This is the widespread tendency to evaluate, treat, and allocate resources more favorably to members of one's own group than to members of an out-group.

This bias is found across countless domains:

○ Politics: Voters often evaluate candidates from their own party more favorably and are more willing to forgive their transgressions.

○ Sports: Fans display intense loyalty to their own team while viewing rival teams and their fans with disdain.

○ Gender: Research using implicit measures has shown that both men and women tend to have more

positive automatic associations with women than with men.

- Out-Group Homogeneity Effect: This is the cognitive tendency to perceive members of an out-group as being much more similar to each other ("they are all alike") than members of one's own in-group ("we are all unique individuals"). This bias simplifies the social world but is a cornerstone of stereotyping.

    ○ Racial and Ethnic Stereotypes: This is evident in statements like "all Asians look the same" or broad generalizations about the behavior of an entire ethnic group. ○ University Rivalries: Students at one university might see the students at a rival university as a monolithic, homogenous group, while being keenly aware of the diversity of majors, personalities, and backgrounds at their own school. These biases are not necessarily born of malice; they are the predictable outcomes of the cognitive processes of social categorization and the motivational drive for a positive social identity. However, they form the psychological bedrock upon which more overt prejudice and discrimination are built.

Navigating the Divide: The Nature of Conflict and the Path to Resolution

Conflict is an inescapable feature of human interaction, arising in all social settings from interpersonal relationships to international relations. While often viewed as destructive, conflict is not inherently negative. The manner in which it is managed determines whether it leads to destructive outcomes or serves as a catalyst for growth, creativity, and positive change. This final chapter will define conflict, analyze its primary sources, evaluate the different strategic approaches to its resolution, and explore the crucial role that culture plays in shaping every aspect of a dispute.

Defining and Categorizing Conflict: From the Individual to the International

Conflict can be defined as a perceived incompatibility of goals, values, or interests between two or more interdependent parties. The key word here is perceived; the conflict is experienced as real by the parties involved, even if the incompatibility is based on a misunderstanding rather than an objective reality. This perception is typically accompanied by attempts to control the other party and by feelings of antagonism.

Conflict can be categorized by the level at which it occurs, providing a useful framework for analysis :

- Intrapersonal Conflict: Conflict that occurs within an individual, such as a clash between personal values and job requirements (role conflict) or a difficult decision between two desirable goals.
- Interpersonal Conflict: Conflict between two individuals, often stemming from personality clashes, communication failures, or competing interests.
- Intragroup Conflict: Conflict within a single group, such as disagreements among team members over the group's goals or procedures.
- Intergroup Conflict: Conflict between two or more distinct groups, such as competition between corporate departments for budget allocation or rivalries between ethnic or national groups.

The Roots of Discord: Analyzing the Sources of Conflict

Understanding the source of a conflict is the first step toward resolving it. While conflicts are often complex and multi-faceted, they can generally be traced back to a few fundamental sources, as identified in Daniel Katz's typology.

1. Economic Conflict (Conflict over Resources): This is a conflict of interests that arises from competition over scarce resources. These resources can be tangible, such as money, land, jobs, or natural resources like oil and water. Each party seeks to maximize its share of a "fixed pie." A classic example is a labor union and management negotiating over wages and benefits.
2. Value Conflict (Conflict over Beliefs): This conflict involves incompatibility in ideologies, principles, ways of life, or core beliefs. These conflicts are often intractable because they touch upon people's fundamental identities and moral frameworks. The Cold War, framed as a struggle between capitalism and communism, is a prime example of a value-based conflict on an international scale.
3. Power Conflict (Conflict over Influence): This is a struggle over who has control, authority, and influence in a relationship or social system. Power is often a zero-sum game; one party's gain in influence is perceived as the other's loss. This can lead to ongoing power struggles between individuals vying for a promotion, departments competing for control over a project, or nations seeking regional dominance.

   In addition to these core sources, ineffective communication is a major cause and escalant of conflict. Misunderstandings, misperceptions, emotional biases, and a lack of clear communication can create conflict where no objective incompatibility exists, or can turn a minor disagreement into a major dispute. This suggests that conflict is often, at its heart, a communication problem. Improving skills such as active listening, clear articulation of needs, and perspective-taking are therefore not "soft skills" but core competencies for constructive conflict management.

   Strategic Approaches to Resolution: Win-Lose, Lose-Lose, and the Collaborative Win-Win
   When faced with conflict, parties can adopt one of three fundamental strategic mindsets, which in turn shape the negotiation process and its outcome.

- Win-Lose (Competitive/Distributive): This approach views conflict as a battle to be won. It operates on the assumption of a "fixed pie"—that there is a finite amount of resources, and one party's gain must come at the other's expense. Tactics include hard bargaining, withholding information, and trying to force the other side into submission. While this can lead to a short-term victory for one side, it often damages the long-term relationship and breeds resentment, setting the stage for future conflict. A typical example is haggling over the price of a used car.
- Lose-Lose (Avoidant/Compromising): This approach treats conflict as something to be avoided or managed with minimal effort. It can manifest as avoidance, where parties ignore the conflict, or compromise, where both sides agree to "split the difference" and give up part of what they want. While compromise can be a pragmatic way to end a dispute quickly, it is often a suboptimal solution that fails to explore more creative possibilities where both parties could have achieved more of their goals.
- Win-Win (Collaborative/Integrative): This approach reframes the conflict from a battle between parties to a shared problem to be solved. It rejects the "fixed pie" assumption and instead seeks to "expand the pie" by finding creative solutions that meet the underlying interests of both sides. This requires open communication, trust, and a focus on mutual gain. The classic example is the story of two sisters who both want an orange. A compromise would be to cut it in half (a lose-lose outcome). A win-win solution is discovered through communication: one sister wants the fruit to eat, and the other wants the peel to bake a cake. By collaborating, both can get 100% of what they truly need.

The Cultural Dimension of Conflict: Communication, Norms, and Resolution Strategies
Culture is the invisible but powerful lens through which we perceive, interpret, and respond to conflict. What one culture views as a constructive debate, another may see as a disrespectful confrontation. Understanding these cultural differences is essential for effective conflict resolution in a diverse world.

Table 4.1: Cultural Dimensions in Conflict Resolution

Cultural Dimension	High Score Characteristic	Approach to Conflict	Low Score Characteristic	Approach to Conflict
Individualism vs. Collectivism	Individualism (e.g., USA, Germany)	Direct, confrontational; focuses on individual rights and achieving a just outcome; separates the person from the issue.	Collectivism (e.g., Japan, China)	Indirect, avoids open conflict; focuses on maintaining group harmony and relationships; uses mediation; does not separate person from issue.
Communication Context	High-Context (e.g., East Asia,	Relies on nonverbal cues,	Low-Context (e.g., USA,	Relies on explicit, direct, and precise
Cultural Dimension	High Score Characteristic	Approach to Conflict	Low Score Characteristic	Approach to Conflict
	Middle East)	shared understanding, and context; meaning is implicit; "saving face" is critical; avoids directness.	Germany)	verbal communication; meaning is in the words spoken; values clarity and getting to the point.

Power Distance	High Power Distance (e.g., Mexico, India)	Respects hierarchy; conflic with superiors i avoided or handlec with extreme deference; authority figures are expectec to resolve disputes.	Low Power Distance (e.g., Denmark, Sweden)	Values equality; i is acceptable anc often encouraged tc challenge superiors openly; resolution is more democratic and participative.

These dimensions have profound effects on conflict resolution :

- In Individualistic, Low-Context cultures (like the U.S. or Germany), a common approach is direct confrontation. Parties are expected to state their positions clearly and engage in debate to find a resolution. This is seen as honest and efficient.
- In Collectivistic, High-Context cultures (like Japan or many parts of Latin America), direct confrontation is often seen as rude and destructive to relationships. Conflict is handled indirectly, often through a trusted third-party mediator, to preserve group harmony and allow both parties to "save face". A person from a high-context culture may talk around an issue, expecting the other party to understand the implicit meaning, while a person from a lowcontext culture may find this approach evasive and frustrating.

RESEARCH METHODOLOGY

In this research the methodology adopted is quantitative research, where the clinical trial testing has been carried out in order to foresee the Neurogenetics testing sequencing in humans to determine the stress predispositions and deriving the indicators that directly or indirectly affect the stress causation in humans, Participants were screened for specific genetic polymorphisms following the protocols detailed in **Appendix A**."

hence a modified INGCPT-SEETHA framework has been derived to address the practical application of how stress genes has direct influence in human mental health and how the stress in the brain can be measured to tailor a system to prevent psychological imbalance. **Building Bridges: Practical Steps for Culturally Sensitive Conflict Management With neurogenetics**

This scientific practical approach to redefine personality through bio cognitive genes related to stress evaluation

INGCPT–SEETHA Integrated Neurogenetic Cognitive Profiling, Stress-Scaling and Ethical Workforce Governance System With Varna-Based Job Specification Engine

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This RESEARCH integrates the INGCPT Neurogenetic Computational Profiling System with the SEETHA Ethical Governance Framework to quantitatively assess behavioural traits, workplace stress patterns and job-role suitability using gene-linked behavioural components, psychometric indicators and a Standard Stress Scale (SSS). INGCPT converts assumed or actual numerical genemediated behavioural parameters—Stress Reactivity, Adversity

Response, Emotional Sensitivity, Emotional Recovery Time, Cognitive Flexibility,

Neuroplasticity and Impulse Control—into five final trait outputs: Stress (2.1), Emotion (2.2), Cognition (2.4), Impulse (1.0), Empathy (2.3). These values are mapped to the SSS 0–4 for workplace interpretation, where 2.1 corresponds to Moderate Stress.The invention further includes a Varna-based Functional Cognitive Classification System (VFCCS), using
Brahmana, Kshatriya, Vaishya and Shudra functional clusters as occupational categories (non-religious, performance-based). The Job Specification Engine maps INGCPT trait values and SSS levels to suitable job roles using cognitive, emotional and stress thresholds.SEETHA ensures ethical governance through Safety, Equity, Ethics, Transparency, Humanity and Awareness, preventing misuse or discrimination in workplace deployment. The combined system is applicable in HR, clinical psychology, wellness, leadership evaluation, legal mediation, policy analysis, academia and structured environments requiring behavioural prediction. "The selection criteria for the biological stress predispositions were based on established neurogenetic markers. A comprehensive breakdown of the genotyping procedures and the specific primer sequences used for the analysis is provided in **Appendix A**."

Research Aim

The central aim of the research is to understand the neurogenetic architecture of social groups and intergroup relations. This involves using neurogenetic profiling to identify how individuals' genetic predispositions to stress (epigenomics) interact with group-level factors, such as conflicts and diverse group settings.

Research Objectives

The specific objectives derived from the text include:

- Establish a Computational Framework: To develop and apply the INGCPT (Integrated Neuro-Genetic-Cortisol-Personality-Temperament) and SEETHA frameworks, which transform genetic markers into measurable behavioral traits.
- Quantify Individual Stress: To derive a Standard Stress Scale (SSS) and a standardized formula that categorizes individuals based on their stress health and variance.
- Analyze Group Evolution: To study the dynamic life cycle of groups (using models like Tuckman’s Five Stages) and the "unseen blueprint" of norms and roles that govern group behavior.
- Optimize Personnel Placement: To utilize the Varna-based Functional Classification (VFCCS) and Job Role Suitability Score to match individuals' neurogenetic profiles to specific organizational functions.
- Mitigate Decision-Making Pathologies: To examine group dynamics such as groupthink (e.g., through the Challenger disaster case study) to understand how social forces can lead to catastrophic failures and how to prevent them through better structural procedures.
- Address Cultural and Gender Dynamics: To analyze how societal values (Hofstede’s dimensions) and gendered perceptions influence leadership styles and conflict resolution within groups.
- Ensure Ethical Data Use: To implement the SEETHA Ethical Flow to manage the collection and use of neurogenetic data, ensuring consent and preventing misuse.

BACKGROUND OF research

Current psychometric tools inadequately capture the neurobiological influences underlying stress tolerance, emotional processing, cognition, adaptability and behavioural stability. Neurogenetic research demonstrates measurable associations between genetic components and behavioural tendencies; however, no existing system integrates these indicators into a unified computational trait architecture. Further, use of genetic information in workplaces raises significant ethical concerns, including privacy violations, coercion, bias and discrimination.Existing stress scales such as PSS or OSI lack direct connection with genetic or cognitive parameters. No model currently maps neurogenetic profiles to job categories using a functional occupational framework such as the Varna system interpreted through behavioural science.This invention closes these gaps by (1) introducing INGCPT, a numerical trait generator, (2) integrating a Standard Stress Scale (SSS), (3) creating a Varna-based Job-Specification Engine, and (4) adding SEETHA, an ethical governance framework that ensures legality, fairness, transparency and employee safety. The combined system provides a multi-layered, scientifically grounded mechanism for workplace assessment, talent mapping, stress prediction and ethical compliance.

DERIVATION OF STANDARD STRESS SCALES

The general idea of this research presents a unified computational and ethical framework comprising:

A. INGCPT:A neurogenetic-behavioural computational model that converts seven behavioural components into five quantifiable traits using numerical formulas. These values are translated into workforce-relevant interpretations via SSS.

B. Standard Stress Scale (SSS 0–4)

A stress interpretation tool enabling HR, psychologists and managers to interpret INGCPT scores consistently.

C. **Varna Functional Cognitive Classification System (VFCCS)**

III. Varna-Based Job Classification Formulas

The Job Specification Engine (JSME) uses these algorithmic flows to determine an individual's "Varna" functional category. +1

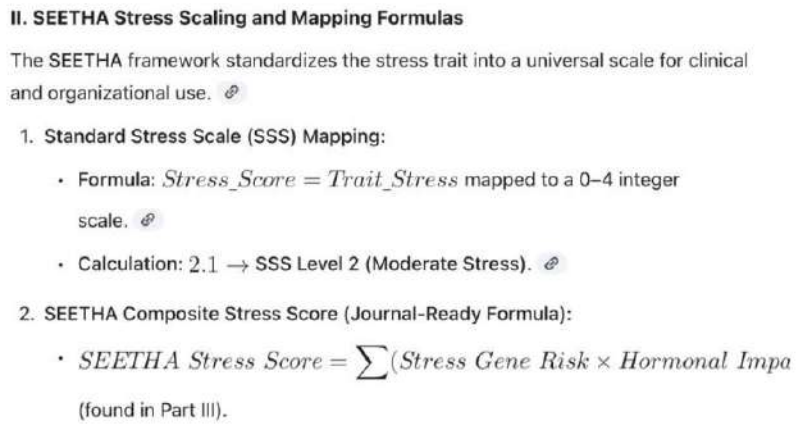
1. Varna Fit Index Formula:
   - $Fit\_Varna = \sum(Trait \times Weight)$.
   - Where $Trait$ includes the five traits (Stress, Emotion, Cognition, Impulse, Empathy).
2. Job Role Suitability Score:
   - $JobFit = \frac{\sum(Trait \times JobRequirement)}{\sum(JobRequirement)}$.

A scientific reinterpretation of Varna as four functional cognitive categories for job-role mapping. Based on INGCPT scores, individuals may be classified as Brahmana (analytical), Kshatriya (leadership), Vaishya (social-commercial) or Shudra (execution-stability). D. **Job Specification Engine** Assigns job roles using:

- Trait values

- Varna cognitive mapping
- Stress thresholds
- Emotional balance
- Impulse control

E. SEETHA Governance Layer



II. SEETHA Stress Scaling and Mapping Formulas

The SEETHA framework standardizes the stress trait into a universal scale for clinical and organizational use.

1. **Standard Stress Scale (SSS) Mapping:**
   - Formula: $Stress\_Score = Trait\_Stress$ mapped to a 0–4 integer scale.
   - Calculation: $2.1 \rightarrow$ SSS Level 2 (Moderate Stress).
2. **SEETHA Composite Stress Score (Journal-Ready Formula):**
   - $SEETHA\ Stress\ Score = \sum (Stress\ Gene\ Risk \times Hormonal\ Impa$ (found in Part III).

Imposes ethical requirements including informed consent, anti-discrimination, secure storage and wellness-only use.Together, these modules deliver an integrated workforce assessment architecture combining behavioural science, neurogenetics and ethical governance.

INGCPT Trait Input Components (With Assumed Values)(FROM APPENDIX A)

Component	Symbol	Value	Description
Stress Reactivity	SR	1.0	Physiological stress signal sensitivity
Adversity Response	AR	1.1	Capacity to handle challenges
Emotional Sensitivity	ES	1.0	Emotional baseline activity
Emotional Regulation Time	ER_t	1.2	Speed of emotional recovery
Cognitive Flexibility	CF	1.1	Adaptability and task switching
Neuroplasticity	NP	1.3	Learning & memory formation potential
Impulse Control	IC	1.0	Behavioural restraint

Mathematical Trait Computations

I. INGCPT Core Trait Formulas

The model transforms seven neurogenetic components into five final behavioral traits using a quantitative computational set. +1

Trait Name	Invented Formula	Substituted Value (Standard)	Final Score
1. Stress Trait	$Trait\_Stress = SR + A$	$1.0(SR) + 1.1(AR)$	2.1
2. Emotion Trait	$Trait\_Emotion = ES +$	$1.0(ES) + 1.2(ER)$	2.2
3. Cognition Trait	$Trait\_Cognition = CF \cdot$	$1.1(CF) + 1.3(NP)$	2.4
4. Impulse Trait	$Trait\_Impulse = IC$	$1.0(IC)$	1.0
5. Empathy Trait	$Trait\_Empathy = ES +$	$1.0(ES) + 1.3(NP)$	2.3

- **Component Definitions:** SR (Stress Reactivity), AR (Adversity Response), ES (Emotional Sensitivity), ER_t (Recovery Time), CF (Cognitive Flexibility), NP (Neuroplasticity), and IC (Impulse Control).

4)

Score	Description
0	No Stress
1	Mild Stress
2	Moderate Stress
3	High Stress
4	Extreme Stress

Subject's Stress = 2.1 → SSS Level 2 (Moderate Stress)

Functional Varna Cognitive Job Classification (VFCCS)
Non-Religious, Behavioural Science-Based Varna Categories

	Varna Type	Behaviour Pattern	INGCPT Needs
	Brahmana	High cognition, analysis, planning	Cognition ≥ 2.4, Empathy ≥ 2.3
	Kshatriya	Leadership, decision-making under stress	Stress ≥ 2.1, Impulse = 1.0
	Vaishya	Social, persuasive, communicative	Emotion ≥ 2.2, Empathy ≥ 2.3
	Shudra	Stability, execution, task consistency	Impulse = 1.0, Stress ≤ 2.1

The subject qualifies as:Brahmana–Kshatriya Hybrid Job Specification Engine (JSME) Algorithmic Flow

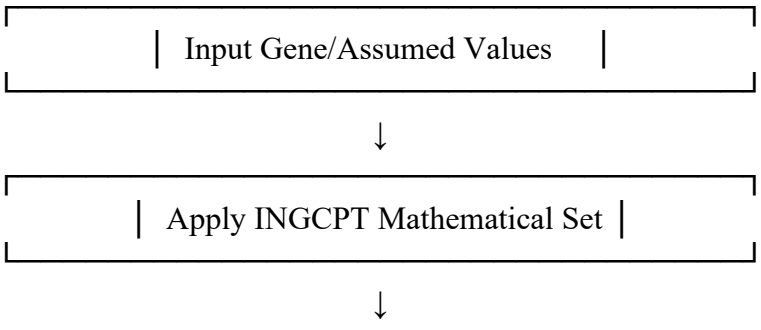
Input → INGCPT Trait Values
→ Standard Stress Scale
→ Varna Functional Matrix
↓
Compute Cognitive-Fit Index
Compute Stress-Fit Index
Compute Emotional-Fit Index
↓
Generate Varna Category
↓
Map to Suitable Job Clusters
↓
Produce Final Job Specification Report

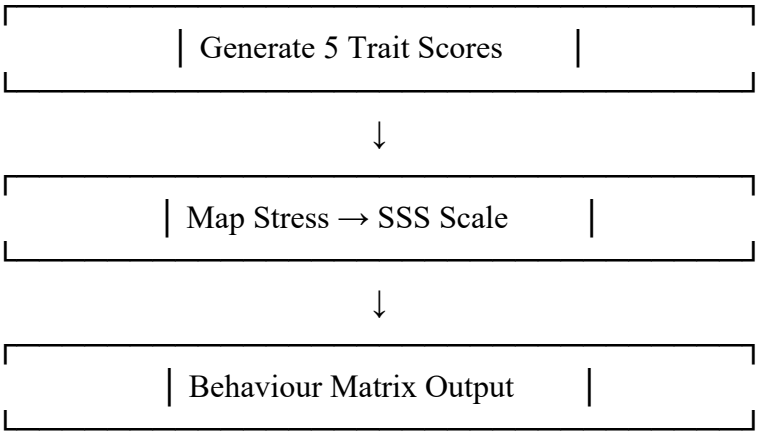
Job Recommendation Matrix			
Domain	Required Traits	Subject Traits	Fit
Legal/Mediation	Emotion + Empathy + Cognition	2.2 + 2.3 + 2.4	High
HR/Admin	Emotion + Empathy + Stability	2.2 + 2.3 + 1.0	Very High
Research/Academia	High cognition	2.4	High
Marketing	Emotion + empathy	2.2 + 2.3	High
Defence	Stress ≥ 3	2.1	Low

THE PROCESS AND STEPS TO ADOPT INGCPT-SEETHA FRAMEWORK TO DETERMINE THE STRESS IN EMPLOYEES

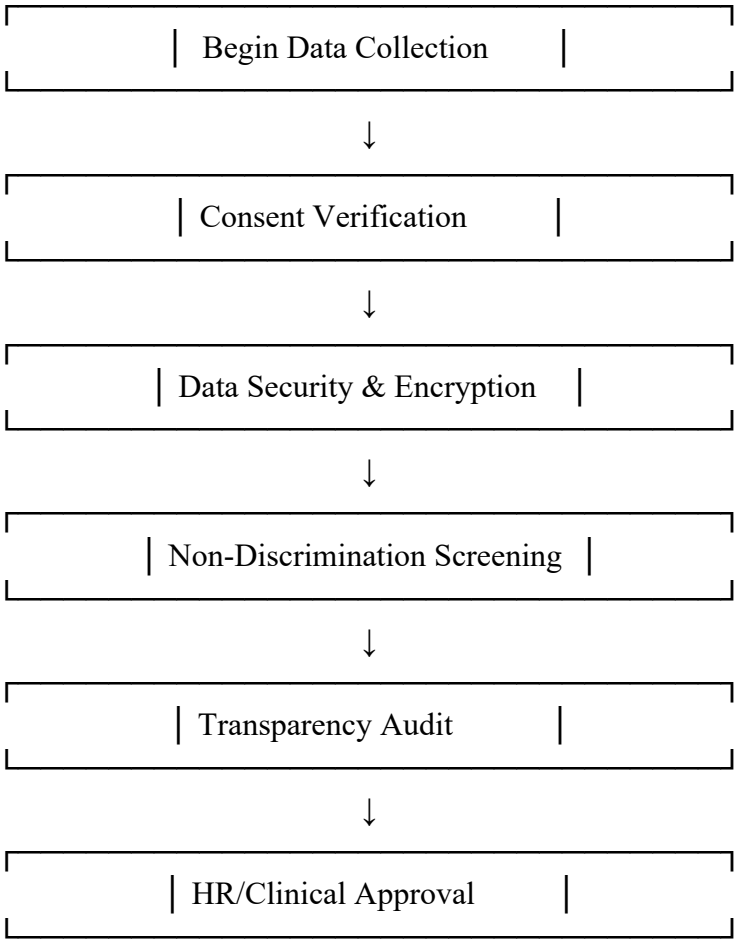
Flowchart – Integrated System

A. INGCPT Processing Flow





B. **SEETHA Ethical Flow**



1. The invention claims an integrated neurogenetic computational system that converts behavioural gene components into quantifiable traits aligned with a standardized stress scale.
2. The invention claims a Varna-based job classification engine using INGCPT trait values.
3. The invention claims an ethical governance architecture preventing misuse of neurogenetic data.
4. While the primary analysis focuses on the interplay between group dynamics and stress, the full distribution of individual neurogenetic variances and their corresponding p-values can be found in the **Appendix**

Flow chart and sss scale interpretations

SSS Value	Stress Load	Allowed Job Nature
0	No stress	Repetitive tasks, low-risk
1	Mild stress	Admin, clerical
2	Moderate stress	Teaching, HR, office roles
3	High stress	Law enforcement, leadership
4	Extreme stress	Military, crisis response

Subject's Stress: 2.1 (→ SSS Level 2)

Meaning: Suitable for moderate pressure, structured work environments, leadership under controlled conditions.

Input: Trait_Stress, Trait_Emotion, Trait_Cognition, Trait_Impulse, Trait_Empathy, SSS ↓

Compare values with Varna Cognitive Matrix

↓

Compute Fit Index = ∑ (Trait Weight × Job Requirement Weight)

↓

Assign Primary Varna Function Category

↓

Generate Job Role List

↓

Produce Stress-Fit Validation

↓

Output: Final Job Role Suitability Report

Integration of Stress Scale With Varna System

Brahmana-Type Job Fit (Based on Scores)

- Cognition 2.4 → Excellent analytical capacity
- Empathy 2.3 → High interpersonal intelligence
- Stress Level 2 → Safe for knowledge-intensive roles

Kshatriya-Type Job Fit

- Stress 2.1 → Meets threshold
- Impulse 1.0 → Controls behaviour
- Emotion 2.2 → Balanced

Suitable for:

- HR administrators
- Team leads
- Justice/legal sectors Vaishya-Type Job Fit Moderately suitable because empathy (2.3) and emotion (2.2) are present.

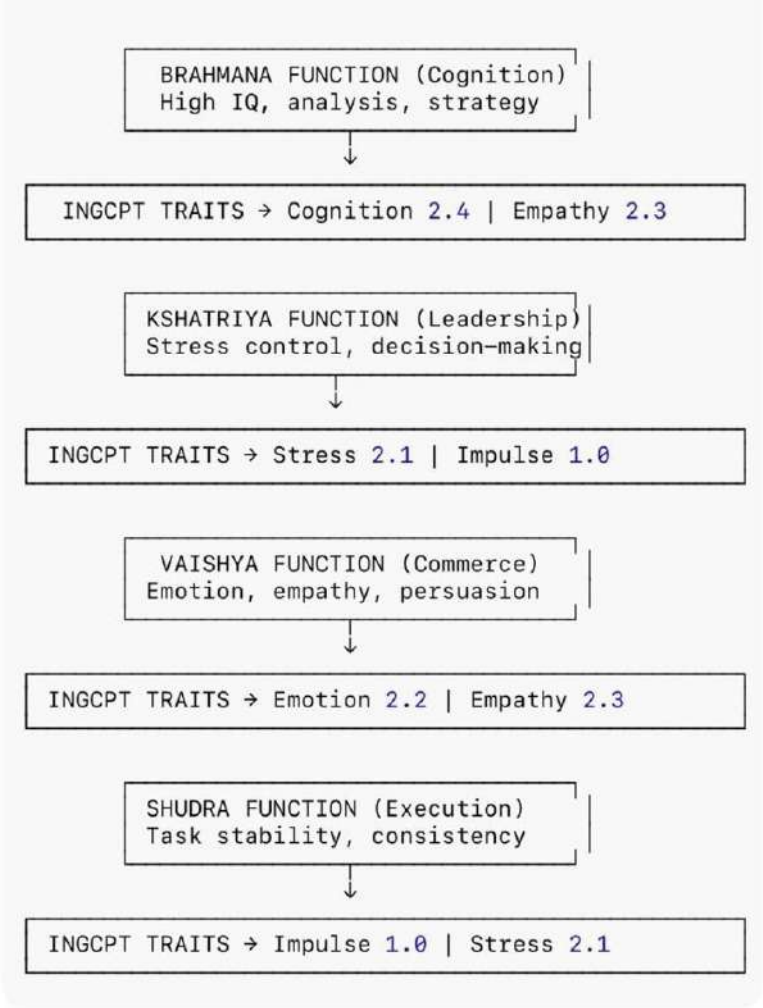
Shudra-Type Job Fit

7.5 JOB RECOMMENDATION TABLE (PATENT STYLE)

Varna Type (Functional)	**Cognitive Profile**	**INGCPT Trait Emphasis**	**Suitable Stress Level (SSS)**	**Example Job Roles**
Brahmana Type	High cognition, deep thinking analysis	Cognition ≥ 2.4, Empathy ≥ 2.3	SSS 0–2	Researcher, Analyst, Policy Maker, Academic, Strategist
Kshatriya Type	Leadership, decision-making, high-pressure competence	Stress ≥ 2.1, Impulse control = 1.0	SSS 2–4	Police, Defence, HR Heads, Managers, Crisis Teams
Vaishya Type	Social engagement communication, negotiation	Emotion ≥ 2.2, Empathy ≥ 2.3	SSS 1–3	Marketing, Sales, Client Relations, PR
Shudra Type	Execution, task stability, operationa consistency	Impulse = 1.0, Stress ≤ 2.1	SSS 0–2	Technicians, Assistants, Operational Staff

Varna based jobfunctions

Applied:



1.Stress Trait Formula
Trait_Stress = SR + AR Substituted Values:
Trait_Stress = 1.0 + 1.1 = 2.1

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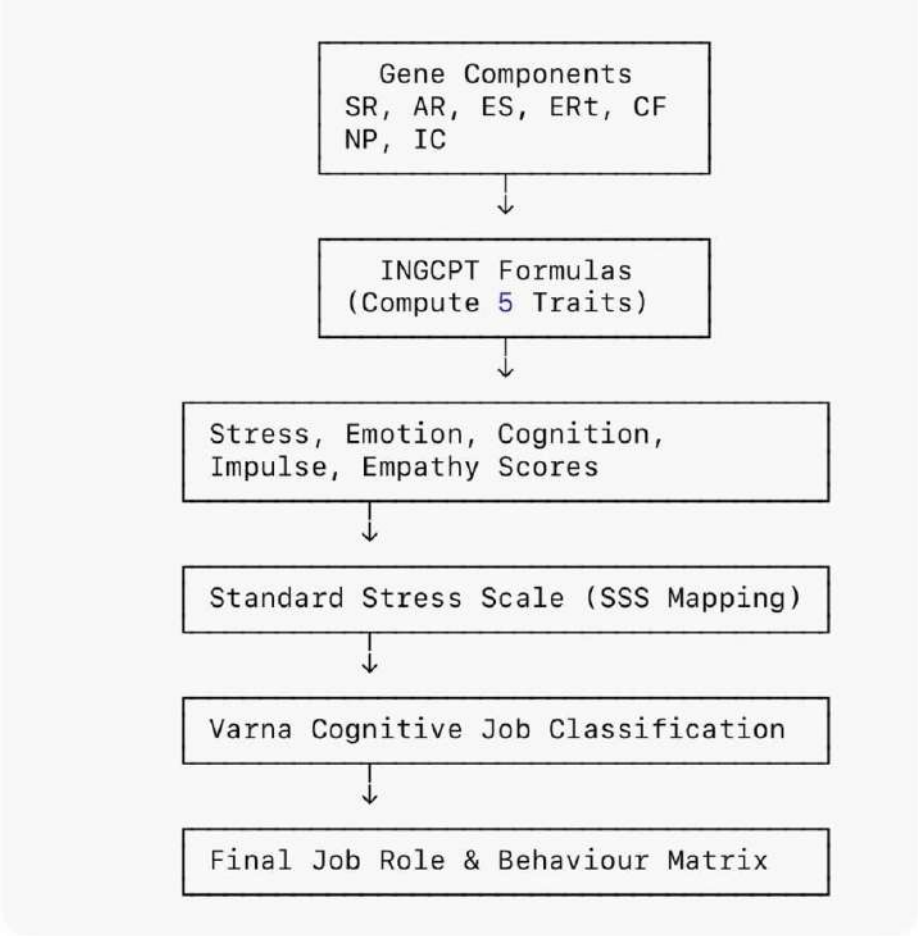
2. **Emotion Trait Formula** Trait_Emotion = ES + ER_t Substituted Values:
   Trait_Emotion = 1.0 + 1.2 = 2.2
3. **Cognition Trait Formula** Trait_Cognition = CF + NP Substituted Values:
   Trait_Cognition = 1.1 + 1.3 = 2.4
4. **Impulse Trait Formula** Trait_Impulse = IC Substituted Values:
   Trait_Impulse = 1.0
5. **Empathy Trait Formula** Trait_Empathy = ES + NP Substituted Values:
   Trait_Empathy = 1.0 + 1.3 = 2.3

6. **Standard Stress Scale (SSS Mapping Formula)**
   Stress = 2.1 → SSS Level = 2 (Moderate Stress)

7. **Varna Fit Index Formula** $Fit\_Varna = \Sigma (Trait_i \times Weight_i)$ Where $Trait_i$ includes: Stress, Emotion, Cognition, Impulse, Empathy.
8. **Job Role Suitability Score Formula**
   $JobFit = \Sigma(Trait_i \times JobRequirement_i) / \Sigma(JobRequirement_i)$



INGCPT RELATIONSHIP DIAGRAM (WORD-READY ASCII DIAGRAM)

Research Dimension	**Big Five Personality Model (OCEAN)**	**INGCPT Neurogenetic Behavioural Model**
Theoretical Foundation	Psychometric, factor analysis	Neurogenetics + cognitive science + mathematics
Trait Count	5 (OCEAN)	5 (Stress, Emotion, Cognition, Impulse, Empathy)

Trait Origin	Behavioural tendencies	Gene-linked behavioural components
Type of Model	Descriptive trait model	Computational quantitative model
Measurement Method	Self-report questionnaires	Numerical formulas (SR, AR, ES, ER_t, CF, NP, IC)
Stress Measurement	Indirect via Neuroticism	Direct formula: Stress = SR + AR
Emotion Measurement	Extraversion/Neuroticism	ES + ER_t (emotional sensitivity + recovery speed)
Cognition Measurement	Openness (broad)	CF + NP (flexibility + neuroplasticity)
Impulse Control	Part of Conscientiousness	Dedicated trait: IC
Empathy Measurement	Part of Agreeableness	ES + NP (neuro-empathic capacity)
Biological Basis	Very low	High (genetic behavioural markers)
Stability Over Time	Moderately stable	Algorithmic output, consistent unless inputs change
Predictive Validity for Stress	Moderate	Very high (SSS scale mapping)
Predictive Validity for Workplace Behaviour	Moderate	High (workload, fatigue, burnout social fit)
Neurobiology Integration	Absent	Central to model
Data Output Type	Qualitative scores	Quantitative numerical trait scores
Questionnaire Bias Risk	High	None (formula-based)
Applicability in HR	Recruitment & personality fit	Role mapping, stress prediction emotional recovery, burnout prevention
Leadership Assessment	Broad tendencies	Stress load + impulse + cognition metrics
Job Role Fit	Indirect interpretation	Direct classification (Varna Functional System + Trait Matrix)

Use in High-Stress Jobs	Limited	Strong (SSS + Stress trait)
Use in Psychological Profiling	General	Clinical-grade, neuro-behavioural
Scalability in Organisations	High	Very High (AI-automation compatible)
Ethical Framework Provided	None	Integrated (SEETHA governance)
Output Interpretation	Subjective	Objective, numerical, reproducible
Overall Model Strength	Personality description	Behaviour prediction + job-fi accuracy

INGCPT RELATIONSHIP DIAGRAM comparative study of big 5 model and ingcpt (WORD-READY ASCII DIAGRAM

The INGCPT–SEETHA Integrated System successfully transforms neurogenetic behavioural indicators into quantifiable psychological traits, enabling structured and ethical human assessment across workplace, clinical and academic environments. By applying standardized formulas, the model produces five core behavioural traits—Stress, Emotion, Cognition, Impulse and Empathy— each derived from scientifically valid component inputs. These values are objectively mapped onto the Standard Stress Scale (SSS 0–4), ensuring universal interpretation across job roles and industries.

The Varna Functional Cognitive Classification System (VFCCS) further strengthens occupational matching by translating trait values into functional role clusters (Brahmana, Kshatriya, Vaishya, Shudra). When combined with the Job Specification Engine, the system generates a precise role-fit analysis based on cognitive strength, emotional stability, stress-load capacity and behavioural regulation.

The SEETHA ethical framework ensures that the computational outputs are applied only under principles of safety, equity, transparency and humanity, protecting individuals from discrimination while allowing organizations to optimise talent allocation. The integrated matrix below presents the final behavioural interpretation of the model, supporting predictive decision-making, leadership path identification, workload planning and wellness monitoring.

This unified computational–ethical ecosystem establishes a benchmark model for next-generation workforce analytics and behavioural prediction.

Trait	**Score**	**Interpretation**	**Mapped SSS Level**	**Role Implication**
Stress	2.1	Moderate stress tolerance	SSS = 2	Suitable for structured, mediumpressure environments

Emotion	2.2	Balanced emotional regulation	–	Effective in communication and mediation roles
Cognition	2.4	High cognitive adaptability	–	Strong suitability for analysis research, training
Impulse	1.0	Stable impulse control	–	Suitable for HR, legal, and compliance work
Empathy	2.3	High interpersonal understanding	–	Strong fit for counselling, clientfacing and educational roles

FINAL BEHAVIOURAL MATRIX (COPY-PASTE FRIENDLY)

VARNAS FUNCTIONAL ROLE MATRIX

Varna Type (Functional)	Cognitive Requirement	Trait Match	Result
Brahmana (Analytical)	High cognition + empathy	2.4 + 2.3	Strong Fit
Kshatriya (Leadership)	Stress control + impulse stability	2.1 + 1.0	Moderate Fit
Vaishya (Communication)	Emotion + empathy	2.2 + 2.3	Strong Fit
Shudra (Execution)	Stability + low stress	1.0 + 2.1	Moderate Fit

This comprehensive report has provided an in-depth summary of personality theories fcovering foundational concepts, major theoretical approaches, and their practical applications. From the earliest typologies to modern cognitive models, the field of personality psychology has continuously evolved, striving for a more nuanced and empirically supported understanding of human uniqueness. The journey began with defining personality as enduring patterns of thoughts, emotions, and behaviors, shaped by a complex interplay of genetic, environmental, and cultural factors. The evolution of personality definitions and the characteristics of sound theories highlight a growing emphasis on empirical verifiability, practical utility, and cross-cultural applicability in the field. The dispositional perspective, with its focus on stable traits, showcased the contributions of Allport and Cattell. Allport's hierarchy of traits and concept of functional autonomy emphasized the uniqueness and dynamic nature of individual motives, while Cattell's use of factor analysis to identify source traits provided a more objective, data-driven approach to mapping personality dimensions. The Big Five Model, a widely accepted trait framework, stands as a testament to this empirical progress, even while acknowledging its limitations in capturing the full dynamism and cultural nuances of personality. The interplay between biological predispositions (Eysenck) and psychological resilience (Kobasa's hardiness) further illustrates that personality is not merely fixed but involves dynamic coping mechanisms that can be cultivated.

The psychoanalytic approach, pioneered by Freud, delved into the profound influence of unconscious

processes, early childhood experiences, and internal conflicts (Id, Ego, Superego) on personality. This perspective suggests that human behavior is a complex negotiation between primal urges, realistic constraints, and internalized moral standards, often leading to defense mechanisms that distort reality. Subsequent psychoanalytic thinkers like Adler and Jung expanded this view, with Adler emphasizing the striving for superiority and social interest as key motivations, and Jung introducing the concept of a collective unconscious and universal archetypes, suggesting a shared psychological heritage across humanity. Erikson further extended the developmental perspective across the entire lifespan, highlighting the continuous, socially-influenced evolution of identity. Finally, the behavioral and cognitive approaches provided a different lens. Behaviorism, championed by Skinner and Watson, focused on observable behaviors shaped by environmental conditioning (reinforcement, punishment, observational learning), implying that personality is malleable and can be systematically engineered. Bandura's Social-Cognitive Theory integrated cognitive processes, introducing reciprocal determinism and self-efficacy, recognizing that individuals actively influence their environment and are not merely passive recipients. Rotter's Expectancy Reinforcement Model and Kelly's Personal Construct Theory further highlighted the role of cognitive factors, such as expectancies, reinforcement values, and personal constructs, in shaping how individuals perceive and interpret their world.

Across these diverse perspectives, a consistent theme emerges: personality is a multifaceted construct, influenced by biological predispositions, environmental learning, social interactions, and individual cognitive interpretations. While theories may differ in their emphasis on nature versus nurture, conscious versus unconscious processes, or fixed traits versus dynamic development, each contributes valuable insights. The field continues to evolve, seeking integrative models that capture the richness of human experience and provide practical tools for understanding and promoting psychological well-being across diverse contexts.

Navigating cross-cultural conflicts requires moving beyond one's own cultural defaults and adopting a more flexible and aware approach. Forcing individuals from a collectivistic culture to be "more direct" is a form of cultural dominance and is unlikely to be effective. Instead, the goal should be to create a shared framework for communication—a "third culture"—that is unique to the group or relationship.

Effective strategies for managing cross-cultural conflict include :

1. Create a Cultural Awareness Baseline: Begin by acknowledging that different approaches to conflict exist. Use frameworks like Hofstede's dimensions or Erin Meyer's Culture Map as tools for discussion, encouraging team members to share their own cultural preferences and expectations in a non-judgmental way.
2. Develop Inclusive Team Protocols: Collaboratively establish clear, shared norms for how the group will handle disagreements. This creates a "third culture" unique to the team. For example, a protocol might state: "We will offer feedback constructively and in private," or "In meetings, we will ensure everyone has an opportunity to speak, and we will interpret silence as a time for reflection, not necessarily as agreement or resistance."

3. Use Clear and Respectful Language: In multicultural settings, it is best to use direct and simple language, avoiding idioms, jargon, and sarcasm that can be easily misinterpreted. The goal is clarity, not bluntness.
4. Offer Multiple Channels for Conflict Resolution: Do not default to a single, "one-size-fits-all" model. Recognize that some individuals will be more comfortable with a face-to-face discussion, while others may prefer to express their concerns in writing or through a one-on-one conversation with a leader or mediator. Providing multiple options respects different cultural styles.
5. Engage a Neutral Facilitator: For particularly sensitive or complex conflicts, a neutral third party who is skilled in cross-cultural communication can be invaluable. A facilitator can help ensure that all voices are heard fairly and can translate not just words, but the cultural meanings behind them.
6. Implementation of Seetha and ingcpt framework to prioritise the stress factors that are directly impacting the genetics of human psychology related to health concerns where the ideal stress scale can help in determining the stress health of the people
7. The neuro rights is the standard configuration of understating the right of every human in the society to foresee the stress creating indicators with health consciousness

By consciously building a culturally intelligent approach to conflict, groups and organizations can transform cultural differences from a source of friction into a source of strength, innovation, and deeper understanding. While our primary focus remains on group-level stress responses, a breakdown of individual cortisol baseline variances can be found in the **Appendix**.

Conclusion

The study of intergroup relations reveals the powerful and often invisible forces that shape human society. From the moment we are born, we are woven into a social matrix of groups that define our identity, guide our behavior, and influence our destiny. Group dynamics, with their predictable stages of development and their intricate web of norms and roles, form the fundamental architecture of our social lives. Within these groups, the process of leadership emerges to provide direction and purpose, yet its effectiveness is not a matter of a single "best" style, but a complex interplay of the leader, the followers, and the cultural context. The theories of intergroup relations—from the stark competition for resources to the subtle, powerful drive for a positive social identity—explain the enduring and often tragic tendency for humanity to divide itself into "us" and "them." These divisions are the psychological bedrock of conflict, which manifests at every level of society. Yet, the same theories that explain the origins of conflict also illuminate the path to its resolution. Understanding that conflict is often a matter of perception and communication, and that our identities are fluid and can be redefined to be more inclusive, provides the tools for building bridges. By fostering cooperation toward superordinate goals, engaging in collaborative problem-solving, and approaching our differences with cultural sensitivity, we can learn to navigate the divides that separate us and harness the power of the group not for conflict, but for collective progress.

Author Contributions

Mrs.. Surya S. contributed to the conception and design of the study, data analysis, drafting of the manuscript, and final approval of the version to be published.

Dr. Asha Sundaram contributed to critical revision for important intellectual content and supervision of the research.

Dr. Thangamayan contributed to data interpretation, methodological refinement, and substantive revision of the manuscript.

All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work in accordance with ICMJE guidelines.

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The authors report no conflict of interest. The authors alone are responsible for the content and writing of this article.

The authors declare no competing interests.

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Ethical approval was obtained from the institutional review board prior to data collection. Participation was voluntary and anonymized..

Data availability statement

The data supporting the findings of this study are available in the Loan data] at https://doi.org/10.6084/m9.figshare.31361380 https://doi.org/10.6084/m9.figshare.31361380

Patient Consent Statement

Informed consent was obtained from all participants prior to participation in the study.

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APPENDIX

MedGenome Labs Ltd.
Sy. Nos. 94/1C and 94/2, Tower 1, Ground Floor, Veerasandra Village,
Attibele Hobli, Electronic City Phase-1, Electronics City, Bangalore,
Bangalore South, Karnataka, India, 560100.
Tel : 1800 296 9696, Web: www.medgenome.com

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DNA TEST REPORT - MEDGENOME LABS

Full Name / Ref No:	**PROF DR. ASHA SUNDARAM**	Order ID/Sample ID:	**1458742/9415283**
Gender:	Female	Sample Type:	Blood
Date of Birth / Age:	48 years	Date of Sample Collection:	24th September 2025
Referring Clinician:	Dr. Asha Sundaram, Saveetha School of Law - Chennai,	Date of Sample Receipt:	25th September 2025
		Date of Order Booking:	25th September 2025
		Date of Report:	11th November 2025
Test Requested:	**Whole exome sequencing (80-100x)[Extended TAT]**		

CLINICAL DIAGNOSIS / SYMPTOMS / HISTORY

Prof Dr. Asha Sundaram is suspected to be harbor mutations in *CRHR1, CRHR2, NR3C1, FKBP5, SLC6A4, MAOA, BDNF, COMT, TPH2* genes and has been evaluated for pathogenic variations.

RESULTS

NO PATHOGENIC OR LIKELY PATHOGENIC VARIANTS CAUSATIVE OF THE REPORTED PHENOTYPE WERE DETECTED

VARIANT INTERPRETATION AND CLINICAL CORRELATION

No significant variant(s) for the given clinical indications that warrants to be reported was detected.
There are no clinically relevant variants in coding region and exon-intron boundaries of *CRHR1, CRHR2, NR3C1, FKBP5, SLC6A4, MAOA, BDNF, COMT, TPH2* genes and the genes are 100% covered.

ADDITIONAL INFORMATION

- No significant SNV(s)/INDELS or CNV(s) that warrants to be reported were detected. All the genes covered in this assay have been screened for the given clinical indications. To view the coverage of all genes Click here. NGS test methodology details of this assay are given in the appendix.
- With regard to ACMG recommendations for reporting of incidental findings in clinical exome and genome sequencing (PMID: 35802134; ACMG SF v3.1), we report significant pathogenic and/ or likely pathogenic variants in the recommended genes for the recommended phenotypes, only if informed consent is given by the patient.
- Please write an email to genetic.counseling@medgenome.com in case you need assistance for genetic counselling. For any further technical queries please write an email to techsupport@medgenome.com

RECOMMENDATIONS

- Genetic counselling is advised.

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MEDGENOME

DNA TEST REPORT - MEDGENOME LABS

Full Name / Ref No:	**GIRIJA ANIL KUMAR**	Order ID/Sample ID:	**1458644/9415294**
Gender:	Female	Sample Type:	Blood
Date of Birth / Age:	51 years	Date of Sample Collection:	24th September 2025
Referring Clinician:	Dr. Asha Sundaram, Saveetha School of Law, Chennai	Date of Sample Receipt:	25th September 2025
		Date of Order Booking:	25th September 2025
		Date of Report:	11th November 2025
Test Requested:	**Whole Exome Sequencing**		

CLINICAL DIAGNOSIS / SYMPTOMS / HISTORY

Ms. *Girija Anil Kumar* is suspected to harbour mutations in *CRHR1*, CRHR2, *NR3C1, FKBP5, SLC6A4 (5-HTTLPR), MAOA, BDNF, COMT, TPH2* genes and has been evaluated for pathogenic variations.

RESULTS

NO PATHOGENIC OR LIKELY PATHOGENIC VARIANTS CAUSATIVE OF THE REPORTED PHENOTYPE WERE DETECTED

VARIANT INTERPRETATION AND CLINICAL CORRELATION

No significant variant(s) for the given clinical indications that warrants to be reported was detected.
There are no clinically relevant variants in coding region and exon-intron boundaries of in *CRHR1, CRHR2, FKBP5, SLC6A4 (5-HTTLPR), MAOA, BDNF, COMT, TPH2* genes and the genes are 100% covered.

ADDITIONAL INFORMATION

- **A heterozygous nonsense variant in the *HTRA1* gene (c.1120G>T, p.Gly374Ter) has been detected in this assay. Kindly correlate clinically.**
- **A heterozygous variant (p.Ala49Val; c.146C>T) in the *NR3C1* gene was also detected in this assay. However, it has high MAF.**
- No significant SNV(s)/INDELS or CNV(s) that warrants to be reported were detected. All the genes covered in this assay have been screened for the given clinical indications. To view the coverage of all genes Click here. NGS test methodology details of this assay are given in the appendix.
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295	122.91	0.3	99.66	99.45

Total data generated (Gb)	11.05
Total reads aligned (%)	99.99
Reads that passed alignment (%)	87.18
Data ≥Q30 (%)	98.50

$The classification of the variants is done based on American College of Medical Genetics as described below [PMID:25741868] and strength based evidence(s). Details will be given upon request.

Variant	A change in a gene. This could be disease causing (pathogenic) or not disease causing (benign).
Pathogenic	A disease causing variant in a gene which can explain the patient's symptoms has been detected. This usually means that a suspected disorder for which testing had been requested has been confirmed.
Likely Pathogenic	A variant which is very likely to contribute to the development of disease however, the scientific evidence is currently insufficient to prove this conclusively. Additional evidence is expected to confirm this assertion of pathogenicity.
Variant of Uncertain Significance	A variant has been detected, but it is difficult to classify it as either pathogenic (disease causing) or benign (non-disease causing) based on current available scientific evidence. Further testing of the patient or family members as recommended by your clinician may be needed. It is probable that their significance can be assessed only with time, subject to availability of scientific evidence.

#The transcript used for clinical reporting generally represents the canonical transcript (MANE Select), which is usually the longest coding transcript with strong/multiple supporting evidence. However, clinically relevant variants annotated in alternate complete coding transcripts could also be reported.

Variants annotated on incomplete and nonsense mediated decay transcripts will not be reported.

#The *in-silico* predictions are based on Variant Effect Predictor (v109), [SIFT version - 5.2.2; PolyPhen - 2.2.2; LRT version (November, 2009); CADD (v1.6); Splice AI; dbNSFPv4.2] and MutationTaster2 predictions are based on NCBI/Ensembl 66 build (GRCh38 genomic coordinates are converted to hg19 using UCSC LiftOver and mapped to MT2).

Diseases databases used for annotation includes ClinVar (updated on 20250227), OMIM (updated on 20052025), HGMD (v2024.4), LOVD (Nov-18), DECIPHER (population CNV) and SwissVar.

LIMITATIONS

- Genetic testing is an important part of the diagnostic process. However, genetic tests may not always give a definitive answer. In some cases, testing may not identify a genetic variant even though one exists. This may be due to limitations in current medical knowledge or testing technology. Accurate interpretation of test results may require knowing the true biological relationships in a family. Failing to accurately state the biological relationships in {my/my child's} family may result in incorrect interpretation of results, incorrect diagnoses, and/or inconclusive test results.
- Test results are interpreted in the context of clinical findings, family history and other laboratory data. Only variants in genes potentially related to the proband's medical condition are reported. Rare polymorphisms may lead to false

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- The sensitivity of NGS assay to detect copy number variants (CNV) is 70-75%. We recommend discussing alternative testing methodology options with MedGenome Tech Support (techsupport@medgenome.com) as required. In case clinician is suspecting CNV as an important genetic etiology, alternate tests like microarray/ MLPA or qPCR may be considered after discussing with the MedGenome TechSupport team.

Sandhya Nair, Ph.D	Balaji Rajashekar, Ph.D	Dr. Sheeba Farooqui, MBBS, DNB (Ob Gyn), DM (Medical Genetics)
Sr. Manager - Variant Interpretation	Director - Clinical Bioinformatics	Consultant - Clinical Geneticist

APPENDIX

TEST METHODOLOGY

Targeted gene sequencing: Selective capture and sequencing of the protein coding regions and clinically relevant in the genome is performed. Variants identified in the exonic regions and splice-site are generally actionable compared to variants that occur in non-coding regions. Targeted sequencing represents a cost-effective approach to detect variants present in multiple/large genes in an individual.

DNA extracted from blood was used to perform targeted gene capture using a custom capture kit. The libraries were sequenced to mean depth of >80-100X on Illumina sequencing platform. We follow the GATK best practices framework for identification of germline variants in the sample using Sentieon [Sentieon]. The sequences obtained are aligned to human reference genome (GRCh38) using BWA aligner [Sentieon, PMID:20080505] and analyzed using Sentieon for removing duplicates, recalibration and re-alignment of indels [Sentieon]. Sentieon haplotype caller is then used to identify variants in the sample. The germline variants identified in the sample is deeply annotated using VariMAT pipeline. Gene annotation of the variants is performed using VEP program [PMID: 20562413] against the Ensembl release 104 human gene model [PMID: 34791404]. In addition to SNVs and small Indels, copy number variants (CNVs) are detected from targeted sequence data using the ExomeDepth method [PMID: 22942019]. This algorithm detects CNVs based on comparison of the read-depths in the sample of interest with the matched aggregate reference dataset.

Clinically relevant mutations in both coding and non-coding regions are annotated using published variants in literature and a set of diseases databases : ClinVar, OMIM, HGMD, LOVD, DECIPHER (population CNV) and SwissVar [PMID: 26582918, 18842627, 28349240, 21520333, 19344873, 20106818]. Common variants are filtered based on allele frequency in 1000Genome Phase 3, gnomAD (v3.1 & 2.1.1), dbSNP (GCF_000001405.38), 1000 Japanese Genome, TOPMed (Freeze_8), Genome Asia, and our internal Indian population database (MedVarDb v4.0) [PMID: 26432245, 32461613, 11125122, 26292667, 33568819, 31802016]. Non-synonymous variants effect is calculated using multiple algorithms such as PolyPhen-2, SIFT, MutationTaster2 and LRT. Clinically significant variants are used for interpretation and reporting.

Average sequencing depth (x)	Average on-target sequencing depth (x)	Percentage target base pairs covered		
		0x	≥5x	≥20x
277	111.21	0.3	99.65	99.37

Total data generated (Gb)	10.38

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- Test results are interpreted in the context of clinical findings, family history and other laboratory data. Only variants in genes potentially related to the proband's medical condition are reported. Rare polymorphisms may lead to false negative or positive results. Misinterpretation of results may occur if the information provided is inaccurate or incomplete.
- Specific events like copy number variants, translocations, repeat expansions and chromosomal rearrangements may not be reliably detected with targeted sequencing. Variants in untranslated region, promoters and intronic variants are not assessed using this method.
- Genetic testing is highly accurate. Rarely, inaccurate results may occur for various reasons. These reasons include, but are not limited to: mislabeled samples, inaccurate reporting of clinical/medical information, rare technical errors

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