

Focus on Research



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CHOOSING SCIENTIFIC GOALS: THE NEED FOR A NORMATIVE APPROACH.

The goals of science, though rarely discussed, should be regarded as a very important topic in the philosophy of science. Knowing what the goals of science are, we can justify what is done in science and how methods and theories are chosen.

For Hempel, the goal of science is to 'produce a sequence of increasingly comprehensive and accurate systems of empirical knowledge'. Popper, on the other hand, believes that science aims for 'satisfactory explanation of whatever strikes us as being in need of explanation'. Thus Hempel and Popper disagree on what the goals of science are, so much so that if we decide to accept one of the views over the other, it would have a considerable impact on how and what we do under the banner of science.

David Baumslag, the author of this article (Stud. His. Phil.Sci.1998:29:81-96), notes that neither of the above mentioned philosophers gives any reason why the reader should accept his goals of science and as a result accepting one or the other view comes down to arbitrary selection. As an alternative, Baumslag, proposes that we should justify the goals of science by normative arguments. By showing that a proposed goal is intrinsically valuable, reason for it to be pursued as a goal can be given.

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THE DANGER OF PREMATURE GRADUATION TO SEAT BELTS FOR YOUNG CHILDREN

Winston FK, Durbin DR, Kallen MJ, et al. *Pediatrics* 2000;105:1179-83.

Motor Vehicle Crashes (MVC's) are the leading cause of death and acquired disability for children older than 1 year of age. Advocates recommend the use of appropriate child restraint systems (CRS's) for children whilst traveling in vehicles. These recommendations include infant and comfortable child safety seats for children younger than age 4, and booster seats for children from age 4 to about age 9.

Despite these recommendations, many children are prematurely graduated to seat belts.

The purpose of this study was to quantify the nature and risk of significant injury associated with premature graduation to seat belts in pre-school aged children.

Data was collected as part of a child-focused crash surveillance system based on a representative sample of children, aged 0-15 years, in crashes reported to State Farm Insurance Companies in 15 states of the US. Driver reports of child occupant injury were collected via telephone using validated survey instruments.

Among those children included in the study, 98% were restrained, but nearly 40% of these children were restrained in seat belts. Compared with children in CRS's, children in seat belts were more likely to suffer a significant injury (RR: 3.5), and in particular they were more likely to suffer head injury (RR: 4.2).

In conclusion, "Premature graduation of young children to seat belts puts them at greatly increased risk of injury in crashes. A major benefit of child restraint systems is a reduction in head injuries."

MOTION ANALYSIS OF CERVICAL VERTEBRAE DURING WHIPLASH LOADING

Kaneoka K, Ono K, Inami S, Hayashi K. *Spine* 1999; 24: 763-70.

In this study the motion of the cervical vertebrae was recorded during simulated rear-end collision using cineradiography. The motion of each cervical vertebrae was analyzed so as to further investigate the mechanism of zygapophysial joint injury.

Subjects sat on a sled that glided backward on incline rails and crashed into a damper at 4 km/h. Cervical spine motion was recorded with cineradiography. Each vertebrae's rotational angle and the instantaneous axis of rotation (IAR) of the C5-6 motion segments were quantified and motions were recorded and analyzed.

Amongst the 10 healthy subjects who participated, 3 distinct patterns of motion were detected (extension only, flexion only, no extension). The authors considered the no extension group to be a result of the low impact speed and if the velocity were high enough, the cervical spines of all subjects would have shown signs of extension motions. Upper motion segments tended to go into flexion, as lower segments were extended and as a result the cervical spine was seen to take on an S-shaped configuration. In this position, the C5-6 IAR moved upwards in the crash motion compared with that in normal motion. As a result, a concentrated force, acted as a rotational torque on C5, stretches the anterior longitudinal ligament, and forces the inferior articular facets to collide with the superior facets of the lower vertebrae. Most whiplash injuries occur during low speed rear-end collisions and rarely produce morphologic changes, such as fractures of the joint.

These authors hypothesize that facet collisions are however likely to impinge on the synovial fold in the zygapophysial joints.

In commenting on the above article, Nikolai Bogduk states: "The study by Kaneoka et al. now fills a critical gap in the story of cervical facet pain. It provides the missing biomechanical link. Theirs is the most significant in the biomechanics of whiplash since the pioneering studies of Severy, et al. in 1995.

CAN IMMUNIZATION PRECIPITATE SLE? REPORT OF 5 CASES.

Older SA, Battafarano DF, Enzenauer RJ, Krieg AM. *Seminars Arth Rheum* 1999;29:131-39

This literature review and case series contends that the pathogenesis of autoimmune connective tissue diseases, such as SLE, remains obscure despite intensive investigation. It has been hypothesized that microbial infection may be a trigger for the initiation of auto anti-body production. The authors of this paper theorize that such a mechanism could also trigger autoimmune disease after deliberate immunization with foreign proteins.

These authors describe the onset of SLE in 5 soldiers who received commonly administered immunization as part of either pre-deployment preparation, basic training induction, or routine soldier immunization. All five cases met American Rheumatology criteria for SLE. The interval between immunization and symptom onset in each case, was similar to that described in serum sickness, however, contrary to serum sickness the manifestations did not resolve.

It is related that none of the subjects had been exposed to drugs known to induce lupus, nor did they relate a family history of connective tissue disease. No subject described signs or symptoms of connective tissue disease before their vaccinations.

In all 5 cases, the temporal relationship and disease onset is surprisingly precise (1-3 weeks), reminiscent of serum sickness like reaction that could have been driven by the large amounts of antigen.

conclude, “recognition of the potential role of vaccination as a trigger for autoimmunity may serve as a focus for further investigation into the etiopathogenesis of connective tissue diseases.

Several categories of “environmental triggers” have been attributed to the precipitation of SLE. These include UV radiation, food, infection, and drugs. The authors propose that immunization be added to that list and

SEVEN TO TWENTY YEAR OUTCOME OF LUMBAR DISCECTOMY

Loupasis GA, Stamos K, Katonis PG, et al. Spine 1999;24:

Past studies of surgical discectomy have shown success rates of over 90%, however long-term results have been less positive with success rates of 40-79% at 7 year follow-up so that there appears to be a significant deterioration with time after surgery.

The present study, aimed to investigate the long term outcome of surgical management for lumbar disc herniation in terms of clinical success, pain relief, disability, patient satisfaction and re-operation.

One hundred and nine patients with surgically documented herniated lumbar disc were retrospectively analyzed by a mailed self reported questionnaire. The mean follow-up period was 12.2 years. Outcomes were considered unsatisfactory in 30% of patients and 28% still complained of significant back or leg pain. The re-operation rate was 7.3%. In conclusion, the authors state, “The long term results of standard lumbar discectomy are not very satisfying. More than one-third of the patients had unsatisfactory results, and more than one-quarter complained of significant residual pain.”

INCIDENCE OF SPINA BIFIDA OCCULTA IN CHILDREN WITH ENURESIS - A BRIEF COMMUNICATION Kalra

V, Palaksha HK. Journal of Child Neurology 1999;14:541-2.

Functional enuresis is defined as urination in the clothing or bed beyond when children should be toilet trained and in the absence of neurological or urological abnormalities. The psychological and social trauma that can result because of their enuresis can be significant. Approximately 20% of 5 year olds, 5% of 10 year olds, and 2% of 12 year olds are enuretic. The rate consistently decreases through the late teens and persists in 1-2% of the population.

The authors of this prospective paper carried out investigative work-ups, including lumbosacral radiographs, on 53 functionally enuretic children. The radiographs revealed 46 (86.8%) of the children to have spina bifida occulta at L5 or S1. This strong association is hitherto unreported. A review of age-related norms for the prevalence revealed that 18-34% of normal children could have spina bifida occulta.

The authors conclude, “This strong association raises an interesting issue in the search for the etiopathogenesis of functional enuresis.”

MEDICAL SOCIETIES ACCUSED OF BEING TOO CLOSE TO THE DRUG INDUSTRY

It was recently reported in BMJ (1999;319:1321) by Scott Gottlieb, that a number of prestigious medical organizations are coming under increasing criticism for being too beholden to the pharmaceutical industry for their income.

In one study, published in the Western Journal of Medicine (1999;171:234-9) it was found that the estimated revenue from pharmaceutical advertising in major medical journals (NEJM, Ann In Med, JAMA) ranged from \$US715,000 to \$US18m. A total that they said could place the organizations in a position of dependency.

It was further noted that 5 organizations raised more than 10% of their gross income from a single journal's pharmaceutical advertising, and 4 organizations raised as much or more from pharmaceutical advertising as from membership.

Another report recently published in NEJM (1998;338:101-6) found that almost every scientist defending the safety of calcium channel agonist, in different papers, editorials, and letters to editors had unpublished financial ties to manufacturers of these drugs.

USE OF A MENTAL ROTATION REACTION-TIME PARADIGM TO MEASURE THE EFFECTS OF UPPER CERVICAL ADJUSTMENTS ON CORTICAL PROCESSING

DD Kelly, BA Murphy, DP Backhouse. J Manip Physiol Ther 2000;23:246-51.

The objective of this study, from the Research Department at the New Zealand School of Chiropractic, Auckland, New Zealand, was to investigate the potential usefulness of a mental rotation paradigm in providing an objective measure of chiropractic spinal adjustment. Further, the authors aimed to determine if cortical processing, as indicated by response time to a mental rotation reaction-time task, was altered by an upper cervical toggle recoil adjustment.

The authors used a prospective, double-blind, randomized, controlled trial design and carried out the study at the New Zealand Chiropractic college clinical training facility. Thirty-six chiropractic student volunteers with clinical evidence of upper cervical joint dysfunction were recruited for the study. Participants in the experimental group received a high-velocity, low-amplitude upper cervical adjustment. A non-intervention group was used to control for improvement in the mental rotation task as a result of the intervention delivered to members of the experimental group.

Participant's reaction time was measured for randomly varying angular orientations of an object appearing either as normal or mirror-reversed on a computer screen.

The average decrease in mental rotation reaction time for the experimental group was 98 ms, a 14.9% improvement, whereas the average decrease in mental rotation reaction time for the control group was 58 ms, an 8.0% improvement. The difference scores were significantly greater for the experimental group compared with the control group, as indicated by a one-tailed, 2-sample, equal variance Student t test, ($P < 0.05$).

This pilot study demonstrated a significant improvement in a complex reaction-time task after an upper cervical adjustment. These results provide preliminary evidence that upper cervical adjustment may affect cortical processing.

HEALTHY INDIVIDUALS MADE SICK BY HOSPITAL ENVIRONMENT

**Tanimoto S, Takayanagi K, Yokota H, et al.
Clinical Performance & Quality Health Care. 1999;7:77-82.**

There has recently been the acknowledgment of the need to create patient environments that are conducive to optimal self-healing.

The purpose of this study was to investigate the types of psychological and physiological changes that healthy people undergo as a result of being put in hospital for 4 days and 3 nights.

Ten healthy volunteers underwent the normal hospital admission process, changed into hospital gowns, received patient meals, were placed in beds facing other patients and generally rested. Psychological and physical tests were performed on the 10 patients before and after the period of hospitalization.

The researchers found that depression, fatigue, and confusion increased after hospitalization, whereas vigor decreased. The findings of increased feelings of depression attributable solely to being in an ICU setting are inconsistent with the type of environment generally considered necessary to alleviate patient anxiety and tension.

The authors concluded,

'The present study found that even healthy volunteers experienced increased feelings of depression when hospitalized in a critical-care environment, despite the lack of evidence of any significant physiological effects.'

THE INCIDENCE OF CANCER ASSOCIATED WITH THE TREATMENT OF RHEUMATOID ARTHRITIS

Beauparlant P, Papp K, Haraouim B Semin Arthritis Rheum 1999;29:148-158

These authors reviewed studies that evaluated cancer mortality in RA patients and the incidence of malignancies in RA patients. They also considered studies in which the incidence of malignancy was measured in RA patients treated with a particular drug.

Relevant articles published between 1966-98 were identified and reviewed. All follow-ups or cohorts evaluating the risk of developing cancer were included.

It was found that that relative risk (RR) of lymphomas associated with RA is about two-fold higher than the general population and that the role for the Azathioprine in the development of lymphomas has been suggested. The authors note that the role of Azathioprine in cancer development was first suggested in 2 prospective studies that reported a higher incidence of non-Hodgkin's lymphomas, squamous cell carcinoma and liver cancer in transplant patients treated with the drug compared to the general population. In RA patients, the role Azathioprine in cancer is less well documented. Two small mortality studies have assessed the risk of cancer associated with the drug in RA patients. One suggests that the drug has a role in cancer formation while the other study, retrospective in nature, documented an increased mortality from malignancies but not from lymphoproliferative disorders.

Furthermore, in a prospective French study, 23 multiple sclerosis patients who developed cancer and that had been treated with Azathioprine, there was a trend towards greater cancer risk in patients with longer treatment duration.

One other drug, Cyclophosphamide, used infrequently in RA, was shown to have a carcinogenic effect. In fact, an increase risk in developing a second malignancy in cancer patients is well documented. In RA patients, cases of lymphomas, solid tumors, and bladder carcinomas have been reported, but only 2 cohort studies have evaluated the risk of cancer associated with this drug. Both studies support a role for Cyclophosphamide in cancer development.

NB - Cyclophosphamide, an alkylating cytostatic drug, has also become known for its tendency to accelerate a number of experimental autoimmune diseases.

COURSE OF ATTENTION AND MEMORY AFTER COMMON WHIPLASH: A PROSPECTIVE STUDY

Di Stefano G, Radanov BP. Acta Neurol Scand 1995;91:346-52.

Permanent suffering and disability commonly occurs after whiplash injury. Previous studies have suggested controversial findings regarding deficient cognitive function following whiplash. Some studies have

documented attentional deficits, while others have not. Regarding learning and memory, previous research has given controversial findings too.

In this study, the authors aimed to prospectively assess cognitive sample in the long term.

The study was based on a non-selected sample of 117 whiplash patients referred from primary care and recruited according to a strict injury definition. Two years following initial trauma, 21 patients remained symptomatic. For each of these 21 patients, a matched counterpart was selected from the group of patients who had fully recovered during the follow-up period. Symptomatic patients and matched controls were compared with regard to baseline, at 6 months and at 2 years.

Results showed no impairment of memory in symptomatic patients. However, in attentional functioning, different levels of improvement were found for symptomatic patients and matched counterparts, with the former showing difficulty with tasks of divided attention.

The authors conclude, “ These findings suggest problems in selective aspects of attentional functioning after common whiplash, which under real life circumstances may explain these patients’ cognitive complaints and cause adaptational problems in daily life.”

A CAUSE OF SUDDEN INFANT DEATH SYNDROME (SIDS) - VERTEBRAL ARTERY COMPRESSION DUE TO HEAD POSITION

Pamphlett R, Raisanen J, Kum-Jew S. Pediatrics 1999; 103: 460-68.

It has previously been suggested that head movements causing compression of the vertebral arteries in the neck with subsequent brain stem ischemia, could underline some case of SIDS. The suspicion that neck movements are related to SIDS has been strengthened by findings of the strong link between SIDS and the prone sleeping position. The purpose of this study was to look for both macroscopic and microscopic evidence of vertebral artery compression in the extended and rotated necks of infants.

The C1-C7 spinal column was removed from infants having died from SIDS or other causes. In 5 cases the neck was extended, in 9 cases it was rotated 90 degrees to the right, and in 6 cases the neck was held in the neutral position. Serial sections of selected blocks were examined microscopically after appropriate fixation.

Three of 5 extended cases showed bilateral vertebral artery compression. Three of 9 rotated cases showed signs of unilateral vertebral compression. No compression was seen in necks held in the neutral position.

The authors hypothesize that an infant sleeping face down is likely to either extend or rotate its head in order to clear its nose from the bedding. These neck movements potentially cause vertebral artery compression and this and the resulting brain stem ischemia provides a pathogenic link between the prone sleeping position and SIDS. Most infants who die from SIDS do so between 1 and 6 months of age.

It is suggested that infants less than 1 month of age may not have the strength or co-ordination to rotate and extend their neck far enough to cause compression. Furthermore, as an infant grows beyond 6 months of age the adverse anatomic factors that predispose to vertebral artery compression (i.e. a small C1 lateral mass, no grooving on C1, and atlanto-occipital instability) begin to resolve, thus both the upper and lower age limits for SIDS can be explained by vertebral artery compression caused by neck position.

The authors conclude, “Because an infant tends to rotate or extend its head in the prone sleeping position, resulting vertebral artery compression could explain why the prone sleeping position is a major risk factor for SIDS.”

MEASLES MAY OFFER PROTECTION AGAINST ASTHMA

[Compiled by Dr Adrian Wenban, BSc., B.App., Sc., M.M.Sc](#)

Bodner C, Anderson WJ, Reid TS, Godden DJ. Thorax 2000;55:383-7.

Asthma is one of the fastest growing diseases with cases increasing by up to 50 percent every 10 years. An estimated 150 million people worldwide suffer from asthma. In this nested case control study of 300 participants, involving a 30 year follow up survey, the relationship between adult onset asthma and atopy, measured in adulthood and childhood exposure to a range of infections, was investigated.

In multivariate analyses both the effect of having two or more younger siblings and of acquiring measles up to the age of three were significantly related to a lower risk of doctor diagnosed asthma. As a result it was suggested that more frequent exposure to infections in a large family group, particularly those spread by the faecal-oral route, may protect against adult onset asthma.

NOTE: In an interview reported by REUTERS on April 19, 2000, the lead author of the above study, Dr. David Godden of the University of Aberdeen in Scotland, said **“What we found was that if they had measles before the age of three they were less likely to have asthma, so there was some sort of protective effect.”**

The authors conclude, “In these well characterised subjects, increased family size and exposure to measles may be associated with a lower risk of adult onset doctor diagnosed asthma”.

CORTICAL REORGANIZATION AFTER STROKE IN HUMANS

Leipert J, Bauder H, Miltner WHR, et al. Stroke 2000;31:1210-16.

Research with animals has led to the discovery that cortical re-organisation occurs after injury to the nervous system so that injury-induced cortical reorganization is now a widely recognised phenomenon. In contrast, there is almost no information on treatment-induced plastic changes in the human brain. The aim of the present study was to evaluate reorganization in the motor cortex of stroke patients that was induced with a program of care.

The authors used focal transcranial magnetic stimulation to map the cortical motor output area of a hand muscle on both sides in 13 stroke patients in the chronic stage of their illness (> 6 months, range: 0.5-17 years). This was done both before and after a 12-day-period of constraint-induced movement (CI) therapy. This short duration of (CI) therapy minimises the possibility that spontaneous recovery of function could give the appearance of response to care.

On the 8 weekdays during the treatment period, the subjects received 6 hours per day of training in use of the affected arm in a variety of tasks according to a behavioural approach called ‘shaping’. The shaping was designed to produce intensive use of the more affected extremity while at the same time improving the quality of movement

Before the 12 days of care, the cortical representation area of the affected hand muscle was significantly smaller than the contralateral side. After care, the muscle output area size in the affected hemisphere was significantly enlarged, corresponding to a greatly improved motor performance of the paretic limb. Shifts of the center of the output map in the affected hemisphere suggested the recruitment of adjacent brain areas.

The authors report that in follow-up examinations up to 6 months after the 12 days of care, motor performance remained at a high level, whereas the cortical area sizes in the 2 hemispheres became almost identical, representing a return of the balance of excitability between the 2 hemispheres toward a normal condition.

The authors conclude, “This is the first demonstration in humans of a long-term alteration in brain function associated with a therapy-induced improvement in the restoration of movement after neurological injury.”

ATLAS- AXIS FACET ASSYMETRY (Implications for manual palpation)

Ross JK, Bereznick DE, Mc Gill S. Spine 1999 - 24: 1203 - 1209.

The purpose of this study was not only to document asymmetry but also to quantify the effects of joint asymmetry on C1 - C2 motion. This article is the first in which the mechanical relations of joint asymmetry to joint palpation are described and the clinical ramifications set forth. C1 - C2 specimens were obtained from 6 human cadavers, forces were applied by a chiropractor with 10 years of practice experience, who is also a teacher of chiropractic skills. The clinician was chosen to generate forces comparable to those generated in chiropractic practice. The resulting vertebral displacement along 3 orthogonal axis was documented with an appropriate camera system.

Different behavior was displayed by each of the 6 specimens. It would appear that asymmetrical joint geometry is a common phenomena and has a significant impact of joint dynamics. This is the case to such an extent that the authors conclude, "clinicians must realize that the perceived restriction does necessarily indicate pathological motion, but may simply reflect normal anatomy. Because spinal joint palpation assumes geometric symmetry from left to right and from one person to another, the implications of these data challenge the validity of palpation as a clinical test of spinal joint function".

LACK OF EFFECTIVENESS OF BEDREST FOR SCIATICA

Vroomen P, de Krom M, WilminkJ, et al. N Eng J Med 1999;340:418-23

The authors of this article contend that, 'Although bed rest continues to be widely used to treat sciatica, evidence from a randomized, controlled trials has been lacking.' They proceeded by conducting a randomized, controlled blinded trial of the efficacy of 2 weeks of bed rest for the treatment of sciatica. One hundred and eighty three subjects with lumbosacral radicular syndrome were randomly assigned to either bed rest or watchful waiting.

Primary outcome measure were investigators and patients global assessments of improvement and secondary outcome measures were changes in functional status and painscores, absenteeism from work, and the need for surgical intervention.

After two and twelve weeks, there were no significant differences between the groups in the primary outcome measures. There were also no significant differences between the groups in any of the secondary outcome measures. Seventeen percent of the patients in the bedrest group and nineteen percent of those in the control group eventually required discectomy.

The authors conclude that the majority of patients with sciatica improve with watchful waiting and that a two week period of bedrest is not more effective.

INHALED STEROIDS DECREASE LINEAR GROWTH OF CHILDREN WITH ASTHMA: A META-ANALYSIS

Sharek0. PJ, Bergman DA. PEDIATRICS 2000;106:e8.

Between 1980 and 1993, mortality rates increased 118% and hospitalization rates increased 28% for children with asthma. With prevalence rates increasing from 3.1% in 1981 to 6.9% in 1994, asthma has become the most common chronic disease in childhood. Evidence that inhaled steroids suppress asthma symptoms in children has resulted in increased use of inhaled steroids so that they are now widely recommended for children with chronic persistent asthma. The risks to the use of inhaled steroids in children with asthma

have become increasingly apparent. These risks include altered hypothalamic-pituitary axis functioning with possible resultant delayed linear growth.

The aim of this systematic review was to determine whether inhaled steroid use is associated with growth suppression in children with asthma. Three databases were systematically searched - Medline (1966-1998), Embase (1980-1998), and Cinahl (1982-1998). Included studies were searched for randomized, controlled trials of inhaled steroid therapy in children with asthma that evaluated linear growth. The primary outcome of interest was linear growth velocity, expressed in centimeters per year. Meta-analysis was performed on all trials that met the inclusion criteria.

A total of 159 studies were identified. Sixty-seven studies were excluded by title or abstract, leaving 92 trials for full-text review. Of the remaining 92 trials, 87 were excluded. This left 5 trials for inclusion into the meta- analysis.

The beclomethasone subgroup showed a decrease in linear growth velocity of 1.51 cm/year. The fluticasone subgroup showed a decrease in linear growth velocity of .43 cm/year.

In summary, the authors conclude, **"the use of moderate doses of the inhaled steroid beclomethasone and fluticasone in children with mild to moderate asthma has been shown to decrease linear growth velocity by 1.51 cm/year and .43 cm/year, respectively."**