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Sustainable Cities
Paper #2 (Topic C)
11/6/08

Slugging toward sustainability

Can cities adopt informally-developed traffic management strategies without limiting their ability to lower carbon emissions? Do they need to, or are community-based efforts and changes to social behaviors enough to sustain carbon reductions? This paper will explore the topic of casual carpooling, also known as slugging or flexible carpooling, and whether or not the practice can perceptibly alter emissions levels in cities.

According to Gillham, transportation in the U.S. represents more than a third of the world's mobile source carbon dioxide emissions.[1] Transportation in the United States has a tremendously damaging impact on our environment and there is increasing evidence that damage has significant global and local consequences.[2] Widespread adoption of alternative transportation models may contribute significantly to limiting these consequences.

One such alternative is casual carpooling. While the practice may exist elsewhere its only confirmed instances are in San Francisco, Houston and Washington D.C./Northern Virginia areas. Riders wait at widely-known locations along commonly traveled routes, often near bus stops or other transit centers. Drivers aware of these locations stop and invite riders traveling on shared routes. Passengers are dropped off at locations agreed to during the pickup. Over time complex but informal etiquette has evolved to police and guide the practice, which can be traced as far back as 1969 when the nation's first carpool lane was opened in Northern Virginia[3].

Casual carpooling requires automobile-oriented infrastructure, leading some to criticize its carbon reduction potential for prolonging car dependence[4]. They argue it diverts resources

from public transport and requires “immense cooperative effort.”[5] As early as 1986, newspaper accounts described such thinking in which public transit officials lament the ridership and fares lost to casual carpooling.[6]

Supporters of slugging, however, suggest casual carpooling may serve as a short term transitional system to limit individual vehicle trips in cities pursuing longterm shifts in their transportation infrastructure.[7] They see it as one of many approaches to limit traffic congestion and improve air quality.

Research into casual carpooling has been limited and much has focused on economic impacts and passenger motivation and not on the practice's environmental implications. Much of the scholarly work which does exist was conducted by Steve Beroldo, a transportation planner in the Bay Area,[8] and Mark Burris and Justin Winn, two Texas scholars who studied Houston's casual carpooling phenomenon[9]. Their work, particularly Beroldo's, figures prominently in discussions of casual carpooling's relationship to congestion, travel modalities and transit usage. It has been used to support efforts to develop high-tech, dynamic ride-matching systems[10],[11] and to support efforts to introduce casual carpooling concepts to other urban areas, such as Auckland, New Zealand.[12]

In fact Paul Minett and John Pearce, the backers of that project, also note the lack of reports that can be used to spur casual carpooling systems in areas other than San Francisco, Northern Virginia and Houston. “It seems to have been approached more from the perspective of describing an anomaly than as a basis for trying to explain it,” they write, arguing that one reason for the lack of studies might be transportation authorities' preferences for bus based or traditional carpooling, and that “Conclusions that carpooling doesn't work appear to have been based only

on analysis of systems that had poor performance, while these high-performing alternatives may have been left out of the mix for philosophical reasons."[13] As private consultants working to implement flexible carpooling in other cities, Minett and Pearce do have their own biases worth noting.

One such criticism of casual carpooling comes from the Southern California Association of Governments in its 2008 travel demand management report. SCAG criticizes Beroldo and Burris and Winn for focusing too heavily on time savings from ride-sharing systems and not their effects on traffic flows at regional levels.[14] Without research exploring the relationship between casual carpooling and traffic flows there is little concrete data available to analyze what degree of emissions reductions cities could accomplish by facilitating casual carpooling.

Researchers have, however, looked more broadly at the relationship between traffic congestion and carbon dioxide emissions. Barth and Boriboonsomin cite Texas Transportation Institute studies on urban mobility showing traffic volume has increased faster than road capacity, leading to progressively worse traffic congestion despite various attempts to relieve that congestion.[15] They draw the connection between that increasing volume as they introduce their research into carbon dioxide as a function of traffic congestion:

> "It is commonly known that as traffic congestion increases, CO2 emissions (and in parallel, fuel consumption) also increase. In general, CO2 emissions and fuel consumption are very sensitive to the type of driving that occurs ... However, it is not clear to what degree various mitigation measures will impact C02 emissions."[16]

Barth's and Boriboonsomin's research is crucial, because their Comprehensive Modal Emission Model rightly addresses a need for microscale models of second-to-second vehicle traffic that large regional studies lacked.[1] Such a model that can be adjusted to a variety of

1 *Ibid*, p. 4

parameters contributes to understanding of how traffic-related emissions change with different variables, such as evolving technology or changing traffic patterns. While they use traffic patterns in Los Angeles as the basis of their model, Barth and Boriboonsomin conclude that small changes in traffic speed that effect carbon dioxide emissions could also be measured in other cities when adjustments are made for local vehicle fleet mixes, the number of vehicle miles traveled at speeds considered “congested” and the VMT at “excessive” levels.[17] Congested speeds can cause more fuel use as cars accelerate and decelerate with traffic. Thus there are higher levels of pollutants produced per mile. Excessive speeds cause increased engine loads, and therefore more emissions are produced.

While not developed for casual carpooling this model may be used to quantify how sluggers are or are not limiting carbon emissions. Cities or regional associations interested in limiting carbon emissions within their jurisdictions may choose to make definitive decisions about whether or not to provide support to casual carpooling using this model as a basis for studies or may find credibility in other studies based on it.

By definition, casual carpooling lacks clear structure and that might make its role in combating climate change difficult to quantify regardless of the model used. Nonetheless it's important to distinguish between casual carpooling and other more formal car pools and organized ride shares. Additionally, as Newman and Kenworthy note, cities with high fuel consumption could increase efficiencies by aiming for higher occupancy, but, they point out, “car pooling has little potential in this area as it offers participants only a limited timetable.”[18] Travellers in cities with lower congestion use individual vehicles more often for longer distances and don't select more fuel-efficient transportation alternatives, leading Kenworthy and Nealson

to echo common arguments that “limiting car use in order to reduce congestion is a more sustainable solution than building freeways.”[19]

Beroldo's research shows that while nearly a third of casual carpool drivers would stop driving to work if there were no passengers participating in the system (thus eliminating the incentive for drivers of access to high occupancy vehicle lanes), only 5 percent of passengers would begin driving. The same statistics, he notes, isn't true for traditional carpools, and he suggests as many as 650 cars per day may be added to the road by casual carpooling.[20]

Still, casual carpooling may offer an alternative to public transit and traditional carpooling by eliminating defined timetables. Sluggers and other flexible carpoolers arrange rides at any time. Drivers opt to pick up riders at their convenience, and passengers join “slug lines” when they need a ride. Theoretically pick-up locations can form anywhere. Timetables and locations are only limited by social buy-in. Moreover, as Levosky and Greenberg note, dynamic rideshare technologies could maximize casual carpooling's potential.[21] If drivers and passengers have more ways to connect with one another to share journeys such technology could make casual carpooling palatable and also more efficient.

Any sort of widespread implementation of new technology would likely require municipal investment, but casual carpooling hasn't been warmly received by municipal officials. Some local transit providers have acted threatened by casual carpooling and municipalities have also been forced to accommodate casual carpoolers by designating pick-up and drop-off areas near transit centers so as to prevent congestion blocking buses from arriving and departing stops on schedule. Some communities levied fines against sluggers stopping in bus zones. Other local and regional entities shied away from support for casual carpooling because of liability fears.[22]

Casual carpooling can save drivers from paying tolls for bridge crossings and highway journeys and it can save passengers from paying bus or train fares or, if they would otherwise drive their own vehicles, from parking, fuel and maintenance costs (in casual carpooling arrangements drivers and passengers don't normally split fuel costs). It also offers time savings when drivers can take advantage of high occupancy vehicle lanes. In fact, Winn and Burris' study into the behavior behind casual carpools in Houston defines such transit as “impromptu carpools formed among strangers in order to meet occupancy requirements of [High Occupancy Vehicle] lanes.”[23]

Casual carpooling can contribute to reductions in energy consumption and carbon emissions by incentivizing ride-sharing through increased travel convenience. Were cities to change their policies toward or officially encourage casual carpooling it might not make much sense to use the “casual” modifier any longer. Regardless, what might such encouragement look like?

Few of the blogs and other resources suggesting casual carpooling as an ecologically-friendly solution to urban traffic congestion support their claims with citations of statistics, academic studies or other evidence. Anyone engaging city governments about casual carpooling policies requires more in-depth examinations and well sourced material for policymakers to make responsibly informed decisions.

For casual carpooling to have more of an impact it would need to expand beyond core work-related trips to include the other journeys for which people rely on cars. Slug lines would need to develop along suburban commercial corridors and across the sprawling fringes of modern cities to serve as functional alternative means for the “trip chaining” Gilham discusses.[24]

That may be unlikely, as there would have to be so many willing participants in casual carpooling systems to accommodate the unique errands individuals take.

Still, cities could foster widespread adoption of casual carpooling through creation of slug line pick-up zones near common destinations, such as outside big box retailers, among concentrations of service providers such as medical offices and near government institutions such as post offices, courthouses and city halls. Individual businesses and associations such as chambers of commerce could assist development of these areas by making available portions of parking lots, promoting the opportunity in newsletters and on in-store bulletin boards, offering volunteers to drive some of the routes (perhaps offering an example to others), and possibly providing security or lighting to address safety concerns. Such cooperation may not limit or scale back sprawl in cities or land use dedicated to automobiles, but it could address the existence of these realities and offer an opportunity for cities to begin to shift transportation habits toward more communal methods.

On the other hand, increased acceptance and use of casual carpools to traverse urban sprawl might also limit business and public support for infill and transit-oriented development. A more robust casual carpooling network might maintain incentives for businesses and residences to exist on the peripheries of cities, where land may be less expensive. That might blunt some of the reductions in fuel consumption and carbon emissions Gillham notes increased density might offer.[25]

Casual carpooling's hope for reducing cities' carbon emissions may be as a transitional modality. Greater acceptance of the practice could increase automobile occupancy and decrease the number of new vehicles on the road while municipalities and other government entities shift

priorities from highway and road construction to mass transit and realigned development. Since casual carpools would use existing infrastructure, the practice could buy time while governments invest in and build new infrastructure.

Increases in casual carpooling may also help cities gradually increase occupancy on non-highway roadways. Cities considering congestion pricing might exempt vehicles with a defined minimum occupancy. They might also create HOV lanes on surface streets as well as highways. Efficient, safe and widespread casual carpools could possibly negate or lower public opposition to conversions of open roads to these regulated lanes. The effect would be to transport more people without building new roads, a possibility described by DeCorla-Souza[26].

Again, flexibility might be the casual carpooling's own obstacle. In lamenting the lack of casual carpools in Boston, for example Alison Lobron writes “Carpooling, by its decentralized nature, has 'very dispersed benefits' so no one group benefits financially in a big enough way for its members to bother lobbying the government.”[27] Citing interviews with various transportation experts she points out that a city like Boston's geography requires a well-publicized technological solution to promote casual carpooling while legislation such as financial perks, increased occupancy requirements in HOV lanes and congestion pricing, and evaluation of personal attitudes about travel are necessary for casual carpooling solutions.

If casual carpooling users would otherwise use single occupancy vehicles then casual carpooling may effectively limit congestion, and the associated carbon emissions produced by increased congestion. If the decreased vehicle trips gained by casual carpooling are replaced by new highway users, those emissions reductions may be lost.

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