The Transfer of Knowledge
Through the Organization of the Neighborhood

by

Elizabeth Alexa Chapman

Submitted in Partial Fulfillment
of the requirements for the
Master of Architecture
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ABSTRACT

In the traditional small community, people learned how to maintain their own homes by watching activities in which the elements of their physical environment were made. This work was done out in the open, where everyone could see it as they walked by. People grew up knowing how to take 'responsibility' for the maintenance and modification of their own home. During and after the Renaissance, when these small independent communities merged with other communities, and a specialized economy developed, the integration of functions which supported learning from the environment began to disappear.

This is a study of a neighborhood in Rome, where the traditional characteristics which support the transfer of knowledge, still exist. The streets are arranged in a hierarchy from most public to most private. When work places, or retail shops, or residences, occur on a public street, they are large. When they occur on a private street, they are small. A hierarchy of building typologies corresponds to the hierarchy of activity sizes. The buildings which are large and located in the public zone, where people are moving quickly, have large openings. The buildings which are small and are located in private zones, where people spend time in the street, have smaller openings. The result is that the building facade exposes the appropriate amount of the work process to the residents, as they use the neighborhood. With this combination of hierarchies, Trastevere supports the transfer of knowledge, from the activities to the residents of the neighborhood.

Thesis supervisor: Chester Sprague
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MAP OF ROME
SHOWING TEANO,
TEVRE AND
THE AREA AROUND IT.
SCALE 1:500 (M)
N°
The initial thinking for this thesis started with an article I wrote with ICCROM, a branch of Unesco, about the negative impact of a 'transfer of technology'. The essential thought in that work was that it is better to provide someone with the understanding of how to solve a problem than to give them a solution which has already been worked out by someone else. At ICCROM we felt that working to fulfill basic needs for housing, clothing, or food, has a certain implicit value. If people direct their daily routines and rituals toward fulfilling some aspect of basic needs, the technology arising from their activities will be meaningful. We felt that if, on the other hand, people must apply some 'black box' - a solution prepared by someone else - to their physical world, then the meaningfulness of the technology is mitigated. The people using technology produced by someone else are subject to the economic and social conditions associated with it, thereby loosing their independence.

At ICCROM we argued that in one case, people receive the knowledge of how to create an 'appropriate technology' while in the other case they receive only the technology whether or not it is appropriate. If the technology is only understood by the manufacturer, the local consumer is dependent on the manufacturer's expertise. For the local con-
sumer, this separation of production and consumption causes both an economic and social dependence which dissolves the link between culture and technology and interrupts self-determination. We concluded by saying that the self-determination resulting from a meaningful relationship between culture and technology depends upon a transfer of knowledge rather than a transfer of technology.

The subject of this thesis is in the same spirit. It is different to the extent that I am now interested in how knowledge can be transferred passively, through the organization of the environment, rather than actively, through intervention. Three concepts are presupposed in this study: 1) people are always observing their environment, 2) people are always learning from what they observe, and 3) learning can occur during daily activities. Information is available in an activity happening in one place to the people doing something in another place. If activities such as sitting on the porch, sipping coffee in a cafe, or shopping at the market, which promote the observation of the environment, can be organized with activities that are informative, such as carpentry or metalworking, the transfer of knowledge can occur.

The knowledge or information that I refer to in this thesis is not necessarily the expertise to build one's own home. Rather, it is
an understanding of materials and their characteristics: how much they weigh, how strong they are, how much skill is required to handle them, can the material be dropped, must it be stored in a particular way, what kind of working conditions are required, does the area need ventilation, does one need a large space, alot of light, and what kind of tools can be used, (are they common household tools, or are they highly specialized.) I feel that if members of a community have this kind of knowledge, they will be able to take more responsibility for the maintenance and modification of their own homes and to make responsible decisions about the maintenance and modification of their neighborhood environment.

By 'responsiblity' I mean several things. In the case when a consumer does not know much about the materials or labor that goes into repairing a good, the only criterion for evaluating the work is economic. Therefore a consumer could make an unrealistic assessment of the required work and choose unwisely to do the work for himself. On the other hand he could choose unnecessarily to rely on a commercial solution which he could do more appropriately by hand. If there is a greater knowledge of what is implied in the work, another situation will arise. The consumer who knows both which craftsman can do the work and the
the space, the tools, and the materials required, can respond constructively. He could do the work himself, with the advise of a craftsman, or do part of the work and contact the appropriate craftsman to complete it.

I also mean to use 'responsibility' in another sense. If a workplace produces a product or a by-product which negatively affects a remote community, there is no binding incentive to change production, without the threat of legal liability. The only criterion in the evaluation of production is again economic. However, when the goods and services are produced where they are consumed and used, the user and the producer affect one another. The user becomes the recipient of knowledge about production and the producer is obliged to make socially responsible decisions about production. The key to this 'responsibility' is the integration of social and economic benefits. This integration can be supported by physical organization which makes it possible to learn from the environment during daily activities.

To understand the transfer of knowledge one has to understand its components and how they operate. One component is observation: the longer one sits and watches another activity, the more one can learn from it. At the same time, the longer one sits and watches an
activity, the more significant it becomes. The more significant the activity is, the more one will care about it's nature. So while one might learn more by watching for a longer period of time, one also becomes increasingly discriminating about the nature of what is being watched.\textsuperscript{11}

The second component of the transfer of knowledge is information: information about the materials we use in everyday life and the skills necessary to work them can be conveyed though hand work or machine work. In some cases hand work involves tools and skills which are easily assessed because most of us have done some hand work in our lives. If great skill is involved it's fascinating to see how someone else has learned to use their hands. However it could take less time to understand hand work than machine work because the methods of production in machine work are less assessable. Machine work, which is loud and potentially dangerous, is an activity one would discriminate against, to the detriment of the transfer of knowledge, since less time is spent watching something which requires more time to be understood.\textsuperscript{12} Without some modification of the exposure of the production processes, machine activity can discourage an observer from obtaining a full understanding of the information which is available.
The third component of the transfer of knowledge is building typologies. Building typologies balance the tolerances of the people observing with the characteristics of the information. The general concept is that building facades and to some extent building organization, vary with the intensity and type of circulation in the street. The affect of the variation is that building facades hide more of the activities which one would discriminate against just where one happens to be observing that building more, and less of the activities are hidden where one would be walking by and observing very little. In this way building typologies balance observation and information so that a transfer of knowledge can occur. (see page 26, work places # 1 and 2)

This thesis is an analysis of a neighborhood. The objective is to understand the principles by which places promoting observation and places providing information, are located. It became clear to me in the beginning of the study that within one neighborhood there can be a range in the scale of each type of activity. Activities are arranged hierarchically along streets which also vary in scale in a hierarchical order. Building typologies follow the same pattern. The hierarchies are related to circulation of people within the neighborhood. The matrices on page 12 illustrate the idea that the larges scaled streets (top matrix) and buildings, (bottom
matrix) occur where there are the most people. The smallest scaled streets and buildings occur where there are the fewest people. The three components of the transfer of knowledge, observation, information and building typologies, are different at different places in the hierarchical progression from public to private. This means that the conditions supporting the transfer of knowledge at any spot in the neighborhood are a result of the organization of all of the neighborhood that occurs on the route before that particular spot.

To understand the organization of the neighborhood I have analyzed the hierarchy of the streets, the distribution of activities, the relationship of streets and activities to observation, information and building typologies and the way in which a place which transfers knowledge works. The product of this thesis is a list of principles advocating the richness and the overlap of activities which contribute to a neighborhood in which individuals can take more responsibility upon themselves for the condition of the physical environment.
During my travels in Europe I asked myself how the residents learned to modify their own houses. During my work at M.I.T. I was asked the question, 'What is participation, and how can the environment support it?' During my work with ICCROM for Unesco I was asked, 'Why is participation so important in the development of a sense of responsibility and how can one participate with technology?' While I live in Rome in 1979, I had the opportunity to observe Trastevere, the old artisan's section of the city. I developed a sense of how a neighborhood can be organized to convey information about the technology of its construction and maintenance to the people who live in it. The plan on page 12 shows how Trastevere is related to the city of Rome.

I have chosen to analyze Trastevere to come to a clearer understanding of how it supports the transfer of knowledge. I think it is a good example of a neighborhood which can be compared with another neighborhood in another city, or to a small suburban community, because, First, it is relatively self-sufficient which means that in an average day, a typical member of the community can fulfill all of his or her needs for work, school, church, friends, home, food, and services. It also contains many of the work places where the common elements of building and neighborhood construction and maintenance are produced. Second, Trastevere is part of
VIEW AS A 'FILTERING DEVICE'

Note how this street becomes so narrow that it obscures the view of the connecting street.

LOCATION OF VIEW IN TRASTEVERE
a culture in which people are gregarious, they spend much of their time in the streets. While this is the nature of the Italian people and not all cultures have this characteristic, this study points out the possibility of a passive transfer of knowledge in other western cultures.

Trastevere is a neighborhood with many different kinds of activities in it. A hierarchy of streets organizes the distribution of activities around the neighborhood. This hierarchy is based on circulation. The greater the number of people and vehicles regularly using the street the more public it is. The fewer the number of people and vehicles regularly using the street, the more private it is. A street can be identified as public or private by the view potential users have of it. The figure on page 14 shows how a view from a main street can indicate that the connecting street is private and only people who know the neighborhood should use it. (In this drawing the street is clearly pedestrian because it is too narrow for a car. One cannot see where the street leads, or what purpose would be served by entering it. The size and maintenance of the building suggest that it is privately owned. Nothing indicates that the street goes to a public place. One who is not familiar with it's destination would not take it. The neighborhood progresses from most public at it's outside edges, to most private at dif-
different places inside the neighborhood. The map on page 17 indicates this hierarchical organization.

Trastevere is about 1/2 mile in diameter. At the edge of the neighborhood are large apartment buildings, 6 to 7 stories high with 20 to 30 families in each. Inside the neighborhood the buildings average 4 stories high and usually cover half the depth of the block with 3 families in front and 3 in back, and a central stairwell. Often there is a retail shop or a work place on the ground floor. Density is equal everywhere, however circulation is unevenly distributed.

A greater number of people use the streets which connect different parts of the neighborhood. Generally, the streets with more people are the streets with faster moving circulation. The typical person on the street, is on his way to some place. This person can be most tolerant of what he observes along the street because he does not spend so much time observing it.

The main streets are the widest, accommodating slightly smaller vehicles than the primary avenues. As a result, the largest facade openings in the neighborhood, occur along these streets. The combination of relatively high tolerance to information and relatively large amounts of exposed work processes supports the transfer of knowledge. It is this
transfer that happens as a result of the way the streets are organized and the activities are exposed which I will concentrate on.

How are the streets organized?

In Trastevere, the most public and heavily travelled streets, the primary avenues, define the extent of the neighborhood. On the map on page 17 they are lightest streets. Each of these primary avenues is different. Viale Trastever, the avenue on the right, has a large number of people and vehicles using it, while the avenue at the bottom, Viale Lungotever, has heavy vehicular traffic but an insignificant number of people walking on it. Through various systems of views and signage the neighborhood is closed to the vehicles and stranger using Viale Trastevere, on the right, while the two main streets into the neighborhood start from Viale Lungotevere which has so much vehicular traffic. These two main entrances are difficult to see however, because of their angle to oncoming traffic.

Most of the traffic coming from Rome proper to the entrances to Trastevere, comes from across two bridges. One must get on the bridge across the river with the specific intention of going to Trastevere because one cannot see beforehand, where the bridge is going. This means that the majority of people using the bridge are familiar with it's destination.
So two features tend to filter out much of the general circulation of strangers who might otherwise come into the neighborhood. First, the main pedestrian entrance is on a predominantly vehicular street and second, the main vehicular entrances are difficult to see from anywhere that a vehicle might approach.

These two main streets connect finally to Viale Trastevere, along the right side of the neighborhood. They are also the pedestrian arteries connecting tributaries from various places inside the neighborhood to its edges. These tributaries are less public side streets which branch off the two main streets. They are semi-public because they are not on a route between activities at different ends of the neighborhood, being instead on a route from residences to minor meeting places. They may be narrow because residences have been built closer and closer to the street in order to expand their space or they may be wide where churches and schools are located.

Finally, there are the most private and usually the narrowest streets in the neighborhood. Here, the width of an individual building is less than on the other streets and their edges are angled and irregular. These streets can branch off of a semi-public street or a public street. There is always some kind of filtering device which adjusts for
the proximity of large numbers of circulating people. (The two views on page 20 show the difference between retail on public and private streets.)

How are activities distributed around the neighborhood?

The plan on page 22 shows the distribution of retail activities in the neighborhood. The three most important pedestrian routes are dotted and the vehicular routes are shown in a dashed line. The largest retail shops are on through streets where there is the most pedestrian traffic. There are also nodes of retail activity occurring at meeting spots within the neighborhood. Retail shops locate wherever there is a large enough potential clientele passing by the shop to support it. When the numbers of people passing by gets smaller, as it does on more private streets, the shops must adjust their size to continue to be profitable. Retail shops also adjust their location in relation to the type of people who pass by the shop. At the outer edge of the neighborhood where shops are used by strangers, visual accessibility is important. Often a shop is located at the bend in the street where it's window can be seen from a distance, encouraging a certain amount of business by chance. Once inside the neighborhood where the people passing by the shops are local residents, who are familiar with shop locations, a particular shop would be sought out, rather than discovered by chance. While this means
LOCATION OF RETAIL SHOPS IN TRASTEVERE

LEGEND:
RETAIL SHOPS -
VEHICLES -
PEDESTRIANS -

STREETS:
PUBLIC
SFM PUBLIC
PRIVATE

CHURCH -
VIEW -
SIGN -
SCHOOL -
that retail shops aren't located in such obvious positions when they are inside the neighborhood, they are clearly grouped around natural meeting places along inner neighborhood circulation routes.

Work places are shops where light manufacturing is done for wholesale consumption. The plan on page 24 shows the locations of work places in Trastevere. Work places are located according to their service needs therefore, clientele from the street is not critical and it is not economical to pay the same rent which retail shop owner's will pay for a spot on a pedestrian route. Large scaled, wide span production, such as heavy manufacturing, occurs along the primary avenues where there is both enough room for machinery and for the large service vehicles which are required. As the demand for service becomes less, the work places are located on smaller streets that accommodate less and less vehicular traffic. Because retail must occupy the streets where there is the most pedestrian circulation, work places (which don't need the service advantage of a primary avenue) must locate on semi-public streets where there is insufficient pedestrian circulation for retail shops anyway. Thus, the distribution of work places and retail shops occurs naturally as a result of the circulation of people and vehicles in the streets.

Often a work place is big enough to span a full block which has a
public street on one edge and a private street on the other. The service and machinery can be on one side of the work place and the people and quiet activities can be on the other. Work places which do require large service vehicles can be located inside the neighborhood on the semi-public streets across from the high blank walls that are the sides or back of a school or a church. Residences aren't usually located opposite the oversized facades and the street can only support retail activity after church or school when there is pedestrian traffic.

Residences are located according to different principles; a resident can find his own home whether it is on a narrow street or on a wide one, whether he has a view of it or not. What is important however, is that there be an area for outdoor activities. A residence can be on a street where a relatively large number of people pass by, in that case, the building will have a protected courtyard for its outdoor activities. The figure on page 26 shows a row of residences on a public street and the courtyard which is off the street for the exclusive use of the residents. If the street has relatively few strangers on it, (see page 27), the residents will use the street for outdoor activities.

How do residences, retail shops, and work places, fit together to
Residences with entrances on the private streets.
transfer knowledge?

I have identified three zones within the neighborhood. Each zone is actually part of a continuum from public to private. In the most public zones, the streets are 20-40 feet wide, the residences are large apartment buildings, the retail shops, which are located where there is pedestrian traffic, are the largest in the neighborhood, and the work places, which are located where there is not pedestrian traffic, are the site of heavy manufacturing. This zone supports the transfer of knowledge to the extent that only a few, quickly paced, pedestrians have the opportunity to glance at the work places and their loading docks.

In the semi-public zones the streets are 12-18 feet wide, there are 6-8 families in each residence, and the retail shops are the average size for the neighborhood. The work places do not exceed a size which can be serviced by a small truck. This zone supports the transfer of knowledge to a greater degree. The people using the semi-public streets know one another a little and because they stop to talk to neighbors, (for eg.) while doing things out on the street, they have time to observe some of the work processes happening in the work places.

In the private zone of the neighborhood, there are 3-6 families in each residence, the retail shops are the smallest in the neighborhood,
and the work places take up the full depth of the block. This zone supports the transfer of knowledge to an even greater degree because residents using the area outside their houses have the opportunity to concentrate on the activity in the work places across the street.

This is a simplified model for the principle of the transfer of knowledge, which says that there is a correlation between the size and privacy of the streets and the amount of concentration they provide; the more private the street, the more knowledge can be transferred. In the public zones people learn while on their way to someplace. In the more private zones, people learn while concentrating on their home environment. Both conditions must be understood. The two components of the transfer of knowledge observation and information, can be identified in activities in all three zones.

Every activity offers either a source of information or an opportunity to observe another activity. The three charts on page 31 show one method of evaluating activities for these two components. The first chart shows four different activities which happen in the neighborhood. They are evaluated in terms of street and activity observation one is able to do while doing one of these four activities. For example, while one is sitting on the porch outside the living place, one has the time...
to concentrate on the street and activities happening along it's edges. But while one is walking one might only have time to glance at what is along the street.

The second chart is an evaluation of how 'tolerant' these activities are to those things which are happening across the street. For example, any activity could tolerate being opposite a scenic view. But the residence which uses the street for outdoor activities would not tolerate a work place with open machinery right across the street.

The third chart estimates the kind of observation necessary to understand different kinds of information. Many kinds of information can be learned from a work place - tools can be seen, the skill necessary to use them can be observed, or the combination of skill and technique can be absorbed. Each of these different types of information implies a different degree of concentration.

The chart on page 22 matches activities which have an information component with activities which have a similar observation component. In the left hand columns, the characteristics of building materials, and the skill necessary to work them, is evaluated in terms of the amount of observation necessary for an understanding. Observation is broken down into two simplified categories, glance and concentrate. The specific
### OBSERVATION

<table>
<thead>
<tr>
<th>Activity</th>
<th>Glance</th>
<th>Observe</th>
<th>Concentrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking by market</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>cafe/rest./bar</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>living</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

### TOLERANCE

<table>
<thead>
<tr>
<th>Activity</th>
<th>Scenic View</th>
<th>People</th>
<th>Services</th>
<th>Work Places</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking by market</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>cafe/rest./bar</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>living apart.</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>living (courtyard)</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>living (frontyard)</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

### MATCHING OBSERVATION REQUIRED with ATTENTION OFFERED

- knowledge components
- tools to be seen
- technique to be learned
- material characteristics
- exposure to tools
- exposure to technique

- attention components
- amount of time required
- amount of concentration required
- concentration to sense
- tolerance of surrounding activities
- degree of claim over area
<table>
<thead>
<tr>
<th>Activity</th>
<th>Information</th>
<th>Time Glance</th>
<th>Time Concentrate</th>
<th>Attention Offered</th>
<th>Time Focused</th>
<th>Diffused</th>
<th>Conc. on Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool Sharpening</td>
<td>Properties of metal</td>
<td>☐</td>
<td>☐</td>
<td>Drug Store</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Electrical Supply Shop</td>
<td>Tools for wire skill, precautions</td>
<td>☐</td>
<td>☐</td>
<td>Cafe/Rest./Bar</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Wood Working</td>
<td>Characteristics of material skill to handle</td>
<td>☐</td>
<td>☐</td>
<td>Market</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>Metal Gutters and Pipes</td>
<td>Technique material tools</td>
<td>☐</td>
<td>☐</td>
<td>Liquor Store</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Roofing</td>
<td>Materials technique tools, unit size</td>
<td>☐</td>
<td>☐</td>
<td>Shoe Maker</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Glass and Mirror</td>
<td>Handling materials tools, skill technique</td>
<td>☐</td>
<td>☐</td>
<td>Magazine and Tabacco</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Framing</td>
<td>Materials tools, skill</td>
<td>☐</td>
<td>☐</td>
<td>Tailor</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Planting, Landscaping</td>
<td>Drainage maintenance tools, space</td>
<td>☐</td>
<td>☐</td>
<td>Bakery</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
information could be sufficiently understood in a glance, or, to derive more meaningful information from the activity one would have to concentrate, or, unless one concentrated one would understand nothing at all. In the right hand columns activities are evaluated in terms of how much the user must concentrate on the activity he or she is doing. Going to a tailor for instance, entails discussing the work to be done and when to pick up the finished product. One would have to concentrate on the situation to note the times and quantities. On the other hand, while shopping at the market, one would have the opportunity to watch what is going on in the street.

This analysis facilitates an understanding of the subtle way that streets and activities fit together to transfer knowledge. Frequently used retail shops are at the edges of the neighborhood along one of the two main streets, anchoring circulation within the neighborhood. Residents going to do their daily shopping, pass by work places on the semi-public streets. Similarly, on the way to school in the morning or to church on Saturday evening, people pass by work places located opposite one of the high walls of the church or the school. Information about the work process can be conveyed to people while they pass by and glance at the work places.
Knowledge is transferred to a greater degree where there are small-scaled retail shops clustered at the corners of the semi-public streets. The street intersections are used as a loading area for work places on the street. The people using the cafes and shops have the opportunity to watch the service activities in the street, so they can develop a simple understanding of the characteristics of materials.

Knowledge is transferred to the greatest degree in the private zones of the neighborhood where people spend much time in the street, watching or talking to neighbors and they have the opportunity to study the work places around them.

The possibility that residents sitting outside their house would have to look at work places right across the street points out a conflict between observation and information. Work places are not always pleasant. There must be a device for modifying the work place so that only an appropriate and tolerable amount of the work process is exposed. If the building facade covers more of the work process in the private zones of the neighborhood, the amount of time spent watching would compensate for the hidden information. Where only a small amount of time is spent watching work places, in the more public zones of the neighborhood, the building facade could compensate by having larger
openings. In this way the typology of the building facade could modify the character of the work place and facilitate the transfer of knowledge.

This is in fact one purpose which the building typologies in Trastevere do serve. If one looks at retail shops, residences, and work places in the three zones of the neighborhood, one would notice that the largest facade openings occur in the public zone and the smallest facade openings occur in the private zone.

The facades on the retail shops in the public zones of the neighborhood are concerned with advertising to the general public with their location, their window displays, and their signage. (see retail #1, page 36) The people who use these shops are members of the neighborhood as well as the general public. The result is that the big retail shops aren't used as neighborhood gathering spots and therefore they don't strongly support observation of other activities. However, as the model for the transfer of knowledge would suggest, work places which are in the public zone expose a great deal of their service and work processes. The work is mechanized with a high rate of production requiring frequent service by large vehicles. These work places have several truck sized openings through which one can see back into the building. While
these work places are a source of information they are usually not near the activities which support observation. They are however, near the large apartment buildings, so residents pass by the work places as they come and go. The residents of the apartment buildings can tolerate being so close to the workshops because their residences are protected from the street. The first floor is used for mechanical space and their private courtyard is behind the building. (see residence #1) 25 So many people use the street that residents don't gather outside. Activities which would not tolerate the work places don't happen along the public streets.

In the semi-public zones of the neighborhood, the retail shops are oriented toward a smaller, more constant clientele. The shops have smaller signs and smaller display windows. (see retail #2) The people who use the shops are familiar with one another and as a result they spend time talking and standing around in the street where they can glance at the work places. The semi-public streets accommodate small trucks the work places along them have facade openings about the size of a small truck. (see work place #2) The result is that the work places are a good source of information and the retail shops support a moderate degree of observation. The circulation to and
from local residences adds to the potential observation. The residences are protected from the street however, because they are usually above a shop or a work place and are accessible through a stair well or a private courtyard. (see residence # 2)

In the private areas of the neighborhood there are only a few retail shops. They are small, have little or no signage or window displays, and doors which are not sharply different from the doors into residences. Sometimes the facades of the retail shops can be distinguished from a residence by the number of people who are outside gathered around the shop. The retail shops strongly support the observation of the street and surrounding activities by the people using it.

The residences have a different character from those in other areas of the neighborhood. Individual ownership is evidenced on the facade by the contrasting techniques of maintenance which have built up over the years to create rich and textured elevations. Often the stairs which were in the inner courtyard in buildings on more public streets, are outside on the residences on the private street. The drawing on page 39 shows an example, (note the work place on the street). The facade openings in the residences are varied in size; unlike the buildings at the edge of the neighborhood which have regular and unmodified openings. The ground
Residence on a private street. Note the workplaces in the lower left corner.
floor of some residences have casement windows while the ground floor of others have only double doors which can be opened fully, as doors, or partially as windows. In the summer time when there are many people gathered outside, the doors can be opened and the street appears to be an extension of a living room. As a result, the residences also strongly support the observation of the neighborhood around them.

In this context, the work places are relatively discreet. Often the facades have openings identical to those in the facades of the residences. (see page 41) The outer wall of the work places may be recessed where the residences have been expanded beyond them. In those recesses hand work can be done or finished products can be stored until they are picked up for delivery to a service vehicle. For the most part, only the hand work or quiet activities can be seen from the private street. One must concentrate to understand the other aspects of the work processes.

These inner areas of the neighborhood may be the most interesting, in terms of the transfer of knowledge. The work places can be small or large, with a variety of either hand or machine work happening inside. The building facades of the work places make them acceptable to the residents so the outdoor activities associated with the residences often incorporates the people and the activities which are going on in the work
WORK PLACE ON A PRIVATE STREET. NOTE HOW SIMILAR THE SCALE OF THE WORK PLACE IS TO THE RESIDENCE IN THE BACKGROUND.
places. The narrow line between work and play, between economic and social activities, is often crossed. The drawing on page 42 shows the typical work place in the private zone of the neighborhood, with people gathered outside to warm their hands around the fire. Often the people doing the hand work on the products which are outside, are the friends of the people who live across the street. The work place then, is a spot to get together and talk, to stay warm, and to fidget with scraps of metal or help move a heavy piece of pipe or wood.

There are five or six of these 'foci' in the inner neighborhood, where the combination of street organization, activity distribution and building typology, supports a situation where the boundaries between economic and social activities are not clear. Information is conveyed in the most profound way at these places, through observation of and involvement with the work place. I feel that it is this involvement which can make it second nature for a resident to solve a problem in the physical environment for themselves. At the same time, the working person can be encouraged by the social climate, the proximity of friends who are local residents, to address the residential world in a responsible way. These important foci can happen because the organization of the streets leading to them has created enough outdoor privacy for private
OVERLAPPING SOCIAL AND ECONOMIC BENEFITS. LOCAL RESIDENTS STANDING OUTSIDE A WORKPLACE TO KEEP WARM.
activities to come out into the street instead of staying in the courtyard.

There are several characteristics of Trastevere which can be used as principles for the design or evaluation of a neighborhood. These principles stress the creation of foci, where the transfer of knowledge can happen, and the circulation routes which connect them. First, in order for the necessary privacy to occur, there must be a hierarchy of streets which permits increasingly smaller scaled activities to operate in greater and greater proximity to one another.

A hierarchy can do this by decreasing the width of successive streets, and by creating views, which because of their length and the buildings along them, are discouraging to the general public. The length of a view can be discouraging because it does not allow a potential user to see the destination of the street.

If the buildings along the edge of the street are of a type which communicates that they are individually maintained, and small scaled, a type which in Trastevere means that the building is private and of no interest to a typical member of the general public, then the discouraging view is reinforced by the building typologies.

The residence on a private street is different from the apartment
buildings at the edge of the neighborhood because the smaller buildings have a greater degree of exposed circulation and use space. What would otherwise be inside, the stairs, the seating, even some rooms, happen outside on the facade. This increased complexity occurs because there is no need to define interior and exterior rigidly, since the people who use the street are familiar with the other residents and the extent of their property. Local residents are sensitive to more subtle signs of ownership. The richness and personality of the facades has the effect of showing other residents the alterations and 'responsibility' which one resident has taken. This can happen because the spaces which one would maintain, are outside where they can be seen.

The result of the hierarchy which occurs because of streets and building types is a change in the scale of activities, from one area of privacy to another. There can be a greater number of work places and retail shops associated with small scaled residences, if the working places can also be small scaled. The distribution of these activities in the neighborhood is important because there must be a correlation between the size of the work place or retail shop and the available clientele or vehicular access.

Finally, the particular facades of the activities are important for
the observer's tolerances to be balanced with the activity's characteristics. In Trastevere this happened seemingly naturally. Over the years activities have selected an optimum location and facades have been correspondingly altered to accommodate the available service and clientele. The result has been that knowledge can be transferred at an intensity which appropriate to the amount of time which residents spend observing.

Newer Neighborhoods, especially suburbs, which serve as a model of modern thinking about zoning and density of activities, are missing the important characteristics of Trastevere. The density and mixture of uses in Trastevere allow and encourage their location and alteration. This is important to the natural evolution of an eco-system of streets, activities, and facades. Not only does this eco-system support the transfer of knowledge outside of formal institutions, as I have discussed in this thesis, it also nurtures the lifestyle that the most lively cities have, and the protection that the most defended places can offer. The integration and proximity of activities could be seen as two of the most important characteristics of the neighborhood.
Footnotes

1 ICCROM is the International Center for Conservation and Restoration of Monuments, located in Rome, Italy.

2 Alejandro Alva and Elizabeth Chapman, Appropriate Technology?, (Paris 1981)


4 The term 'appropriate technology' is being widely used by specialists in conservation and national development. It implies that there are some methods of intervention in traditional culture which when used are more appropriate to the customs of the local people.

5 If the situations in which we learn, can be divided into 3 categories; formal institutions like a church or a school, informal observation of what is to be learned, and guidance or instruction from the family, then I am analyzing the second. I am interested in the observation of work places; not necessarily the work places which would teach one all the work one would ever need to do, but work places which handle commonly encoun-tered materials.

6 The important idea here is that some activities do not require complete concentration from the person who is doing them in order to do them adequately. In that case, it is possible for the person doing the activity to observe other activities while still completing their own task.

7 This idea comes from a study of learning traditional skills which was done at ICCROM by Alejandro Alva, in which he found that the sense of the characteristics of materials is one of the most basic skills to be learned.

8 Alvin Toffler, Future Shock, in which he discusses the idea that our high technology is isolating us from other people and our own environment by making it impossible to work on the physical elements of our environment with our own hands, or to know the people who do work on the environment.
Jane Jacobs, *The Death and Life of Great American Cities*

Lewis Mumford, *Technics and Civilization*, in which he discusses the idea that since the Renaissance, when people began to separate need from profit, there has been a tendency toward irresponsibility in production. This conclusion is drawn from my own observations and thinking in the United States and in Rome. I am assuming here that machine work is more complex than hand work. This may not always be the case, or it may be sufficient to just understand that the particular work process requires a machine and it cannot be done by hand.

The types of people I refer to here are the people who either live in the neighborhood or familiar with the people who do, and the people who live in other parts of the city and are not familiar with the people who live in the neighborhood. The components of the transfer of knowledge are different in different zones of privacy, for instance, observation time is longer in a private zone than in a public zone. Each zone serves as a filter to the following zone so that each place in which knowledge is transferred depends upon the conditions before it.

The definition which I use for public and private in this thesis, is based on outdoor spaces. For example, I refer to the most private spaces as the quiet streets inside the neighborhood and the most public space as a busy main street. Although there are much more private places, in the house, for instance, because this thesis is an analysis of streets and street edges, the range of public to private is applied to streets. A private house then, is a house on a private street, a public house, a house on a public street.
Views and signage serve the purpose of defining the privacy of a street to people who don't live on it. A view is a relatively passive method of limiting access to a street. It works only if the numbers of people who get as far as the view can be sensitive to it. If however, a private area is adjacent to a heavily traveled street and people would enter the private street regardless of a discouraging view, a stronger deterrent, a sign, is necessary to define privacy.

refers to the same idea stated in footnote # 16

In many cases, I refer to the idea that an activity 'locates' in a certain way. This is a notation for the idea that an activity will be located according to patterns of use. By 'adjust' I mean that the same type of activity operates at a different scale depending on the business which it can do in different places. The factors which are adjusted are square footage, volume of goods, size of facade, and size of facade openings, type of signage, and level of maintenance.

While there are work places within the neighborhood which are not only wholesale manufacturers, for the purpose of this study I am considering those under the category of retail shops. Work places which are not only manufacturing places but also retail shops, contribute differently to the components of the transfer of knowledge.

The outdoor activities which I refer to in this thesis include cooking outside, talking to other families who live in the building, sitting and watching for friends passing in the street, playing ball, or watching a neighbor's children.

There are many activities which happen in the streets where people know one another. I mention stopping to talk as an example because it encompasses the activities which result from planned meetings on a street corner, chance meetings in or outside a shop, or talking from the street with someone inside a building. Theoretically, each of these social activities could be rated in terms of how much they promote observation of the surrounding environment. Watching from the window, for instance, can promote more observation than engaging in a
conversation. The point of the argument however, is that certain common social activities requiring little or no effort in order to participate in them, allow an individual the opportunity to diffuse his attention. They can keep the individual in the vicinity of a work place for an extended period of time, whether or not he is watching it. The result is that the individual can become accustomed to interacting near the work environment which ultimately helps make the work processes more acceptable for that time when he will have the opportunity to deliberately observe it.

While some complex activities will be glanced at and only understood superficially, others will be studied and absorbed. It is not possible to make an exact correlation between observation and information by locating activities with reciprocal needs for observation and information opposite one another. However, if a range of activities, each supporting a different kind of concentration on the environment, can be included in the neighborhood, it is possible to have both the superficial and the profound kinds of learning.

The level of technology of the tools used in a work place affects the comprehensibility of the work processes. For the purposes of applying what is observed in the work place to work which is done in the home, it would be most instructive if common household tools were used in the manufacturing of goods. While this is not always the case, the handwork is often done near the front of the work place because it is the last work to be done before the product can be picked up for delivery, thereby allowing for an easy transfer of the kind of knowledge that is naturally most assessable.

One of the benefits which occurs because there are larger openings on wider streets is that fewer and shorter glances by observers using the street, can be compensated for by a larger quantity of visually assessable information. While it is clear that the design of Trastevere does not come from considerations of the transfer of knowledge, it is worth noting that the traditional roles of location and facade organization, resulting from a simple solution to a problem of retail or production, lighting or exposure, do in fact promote a transfer of knowledge at the same time.
The idea of 'knowability' suggests that there is a critical number of people who can live in one area, beyond which people cannot become familiar with one another and the comfortable situation in which one lives among people one knows, cannot arise. The issue of 'knowability' was first brought to my attention in the 1979 preparation for Urbino. It has also been discussed in a slightly different way by Jane Jacobs and Oscar Newman.
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